

Lake Superior State
Forest Sustainable
Forest Management
Pilot Project

REPORT

13



A Forest Management Planning Guide for the Lake Superior State Forest

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Executive Summary

This guide provides a template for sustainable forest management planning. It was developed using Michigan's one million acre Lake Superior State Forest (LSSF) as a "real forest" around which the planning template could be constructed.

The guide is a product of a year-long project. The project, funded by the Great Lakes Environmental Protection Fund, was intended to create a sustainable forest management planning process. The planning template was designed to meet the requirements for sustainable forest management certification as outlined in the Canadian Standards Association (CSA) documents CSA Z808-96 and CSA Z809-96. The planning system should also meet the requirements of the Forest Stewardship Council's sustainable forest management certification system.

The project has compiled a series of twelve documents that evaluate aspects of forest management as defined by the CSA. This guide, the thirteenth document, integrates the information provided in the others into a suggested process for conducting and continually improving sustainable forest management planning on lands managed by the Michigan Department of Natural Resources (MDNR).

The project included several workshops. Three were targeted at MDNR staff, and were intended to ensure the product being developed was well understood and reasonably practical. Three public workshops, involving over 60 LSSF stakeholders, were intended to solicit public input into the development of a public consultation process for inclusion in the planning template, and the development of local criteria, values and indicators of sustainable forest management for the LSSF.

This guide provides direction for developing a forest management plan. It describes the assignment of responsibility and authority for forest management activities, the role of the public in the planning process, the establishment and use of criteria and indicators, and the collection and analyses of background information to support the planning process.

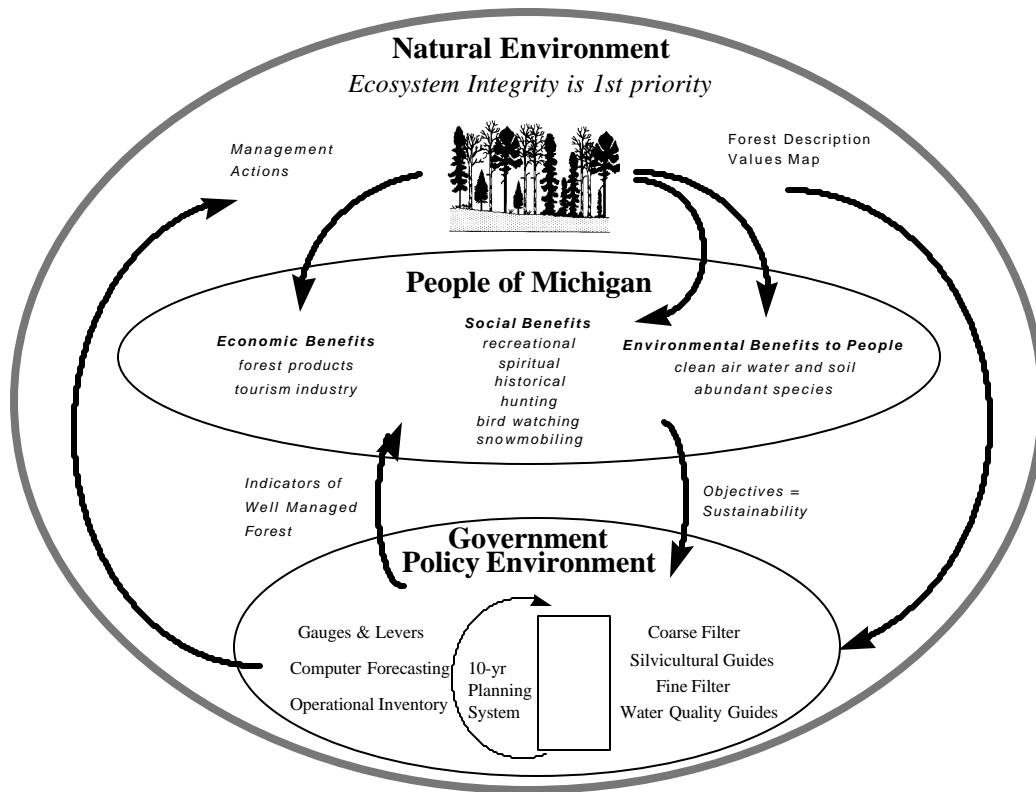
The guide provides suggestions on actual requirements of a forest management plan. Processes for establishing terms of reference, consulting the public, and documenting pertinent planning information are provided. Also included is a process for developing a forest description consisting of the history, administrative make-up, socio-economic profile, and condition of the forest. Methods are presented for incorporating publicly-derived criteria of sustainable forest management into broad forest management direction and more specific management objectives, targets and strategies.

The guide specifies processes that can be used to evaluate management alternatives and to determine the ability of each alternative to sustain the forest. Ultimately, the management strategy that, over time, best produces the desired benefits or outcomes, as described through the public consultation process, will be the one used to direct operational planning.

Details are described for operational planning for the recommended 10-year planning period, including values protection planning, silvicultural planning and access planning. Monitoring of activities via publicly-identified indicators is discussed.

Finally, a section on annual operational planning and monitoring is presented.

The guide has been written as a process for conducting integrated, multi-value forest management planning. As indicated in the following figure, the plan should bridge the sometimes large gaps between a fundamental requirement to maintain ecosystem integrity, the benefits desired by the people of Michigan, and the policies put in place to manage those benefits. The planning system proposed in this guide evaluates the social, economic and environmental benefits provided to the people of Michigan and proposes methods for finding the best solutions for optimizing them.



The public, through politics, policy and pragmatic comment, influence the actions of the resource manager. The actions of the resource managers, monitored for their effect on ecosystem integrity, as well as economic, social and environmental benefits, are reviewed and improved on a continual basis to ensure the State's forests are managed in a manner that best meets the shifting needs of the people of Michigan. The planning system recommended here will require a comprehensive look at the forest area once every 10 years. Within this will be a requirement to project the long-term (i.e., 150 years into the future) sustainability of the forest.

The planning system presented here is constrained by the limits of reasonably available information. Current timber inventories are not as rigorous as they need to be. Wildlife, recreation and ecological information needs to be significantly improved to offer resource managers and stakeholders the opportunity to understand the inter-relationships in a meaningful way. Socio-economic influences and effects will be better understood as the knowledge base improves.

The planning system has been designed to allow and encourage this new information to be included in the process as it becomes available. The requirement for improvement is continual. It is reasonable to predict that, as this new information is understood and turned into knowledge, the activities of all forest users will change to incorporate it.

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1. Introduction

A forest planning system is required to ensure the orderly management and use of Michigan's forest resource and to assist in the assessment of sustainability.

In the past, management has been focused at the compartment level, with iterative planning undertaken annually. What is needed now is a long-term plan that applies to the entire State Forest. The operational planning that has been done at the compartment level must be supported by a forest plan that enunciates the goal and management objectives for the entire State Forest. Planning at a higher level is necessary to ensure forest sustainability and to direct and support annual operational planning. Forest sustainability must start and end with the land and cover types (ecosystems, forests) it supports.

The Michigan Department of Natural Resources (MDNR) does not currently have formal legislation that requires the State to prepare and follow an approved management plan developed within an open and consultative public planning process. However, there is a policy (Natural Resource Commission (NRC) Policy 2207) that requires that plans be developed, and a procedure (2207.7) that outlines factors to be considered in the preparation of a plan. To date, Policy 2207 has not been well-implemented because of a lack of funding and direction and the absence of a formal planning system. Nonetheless, the Department's mission statement, "*The Michigan DNR is committed to the conservation, protection, management, use and enjoyment of the State's natural resources for current and future generations*", strongly endorses the concept of sustainable management. MDNR's Forest Management, Wildlife and Fisheries Divisions all have individual mission statements endorsing the management of Michigan's resources for the benefit of future generations.

The planning system is the principal mechanism for translating the commitment to sustainable forest management, expressed in State legislation and policies, into management actions and activities at the local (forest) level.

The system proposed here will provide a vision of the type of forest that will exist in both the near (5-10 years) and the longer term (100-200 years). It will identify a sustainable stream of benefits expected to be generated from

the forest, as well as the operational techniques that will be used to generate them.

The system includes “feedback loops” that provide forest resource managers with a mechanism to review and improve continually all aspects of their forest management activities. As an adaptive planning system, continuous improvement is fostered through planning, reviewing and replanning.

This guide recommends that forest managers not only provide an opportunity for the public to contribute to the management direction for state forests, but that they do so in a manner that is open, transparent and correctly identifies the roles and responsibilities of those charged with implementing the plan.

This guide includes several examples of how the outlined planning process can be implemented. Most of these have been extracted from information generated as part of a Great Lakes Environmental Protection Fund project aimed at developing a sustainable forest planning system for the Lake Superior State Forest (LSSF). The documents from which these have been drawn are cited within the text and listed at the end of the document.

The guide also contains sample tables for some of the items required in the management plan. These templates cover only some of the resources and activities that are to be included in the forest management plan.

It will be noted that most of the examples used in this guide are taken from state activities in what would classically be defined as “timber management”. The reader may have the impression that this document is largely intended to be a timber management guide. The authors would argue that that would be a very limited interpretation of the direction provided herein.

In a pragmatic sense, timber management examples are used because the most and best documented social, economic and environmental experience available in forest management revolves around the extraction of timber. Harvesting timber will, in all likelihood, remain the most common and affordable tool forest managers have to manipulate the state of the forest.

However, this guide is intended to provide direction for consideration and inclusion in a sustainable forest management plan of many other “values” that the LSSF offers. Wildlife, recreation and fisheries values should be

specifically included. Socio-economic and spiritual values should be addressed. Broader ecological values need to fit into the long-term evaluation of the management of the whole forest.

The planning guide outlines a large role for the public in the management of the LSSF. The public will be called on to establish the values that guide management activities, to participate in the development of relevant, understandable and practical indicators of success in maintaining and enhancing those values, to help confirm management targets for indicators, and to review and comment on practices to achieve those targets.

Finally, the overriding consideration in this guide is that review and improvement will be a perpetual obligation of forest managers. It is fully expected that as our collective knowledge of forest ecosystems improves, our abilities to manage them in an increasingly holistic manner will also improve.

2. Planning Process Overview

2.1 Responsibilities

The planning process starts when the district planning specialist, in reporting to the district supervisors of each division (e.g., forest management, wildlife, recreation), identifies a need to develop a forest management plan. This can be part of a normal planning schedule (a plan is produced every 10 years as required by policy) or the result of a significant change in the circumstances of the forest (e.g., a forest fire burns a third of the State Forest).

The district supervisors, in consultation with the planning specialist, then form a planning team to develop the management plan. The planning team will include MDNR staff with expertise in forest management, fish and wildlife, forest recreation, parks, forest ecology and forest protection. The planning team should have representation from all relevant divisions, and should include members from each of the subdivisions (i.e., forest areas) within the State Forest. The district supervisors will appoint one member of the team, normally the planning specialist, as the chair of the planning team and primary author of the plan. It is this team that will make all the functional decisions required in the production of the plan.

Public meetings and focus-group workshops should be held to advise the planning team on matters relating to the management of the State Forest. This topic is expanded upon in Section 6.2.

The district supervisors should notify other government agencies that the planning process has begun and solicit their input.

2.2 Authority

Forest management plans are currently required under NRC Policy 2207, which states that forest management plans are to be prepared by the Department of Natural Resources.

2.3 Scope

The management plan will be a multi-resource plan for the State Forest for which management is being planned. The management system requires that projections of activities be made over long time frames (100 or more years) in order to assess sustainability. Annual planning will be undertaken to confirm the decisions made within the plan. The management plan will be renewed on a 10-year cycle.

2.4 Basis for a Certifiable Environmental Management System

A planning system forms the basis of an environmental management system (EMS) for state forest lands. To meet the requirements of any sort of certification, a planning system must have various components (Figure 2-1). A formal commitment (e.g., policy) to sustainable management and an open and consultative planning system are required. This commitment is implemented through a hierarchical planning system that includes a management plan and annual operating plans. The system is monitored through annual public reports. Finally, the implementation of the system is critically reviewed by proponents, regulators and the general public, as a component of the subsequent plan.

2.5 Definitions

Throughout this guide, a number of terms are used that require explanation. They are as follows:

Criterion:	Broad characteristic of the forest that is considered valuable and worth maintaining and/or enhancing.
Forest Operations:	All activities undertaken on State Forests to manipulate forest cover, provide access, or generate a benefit. These include the silvicultural operations and recreational, wildlife, environmental or socio-economic protection activities that require manipulation of forest cover.

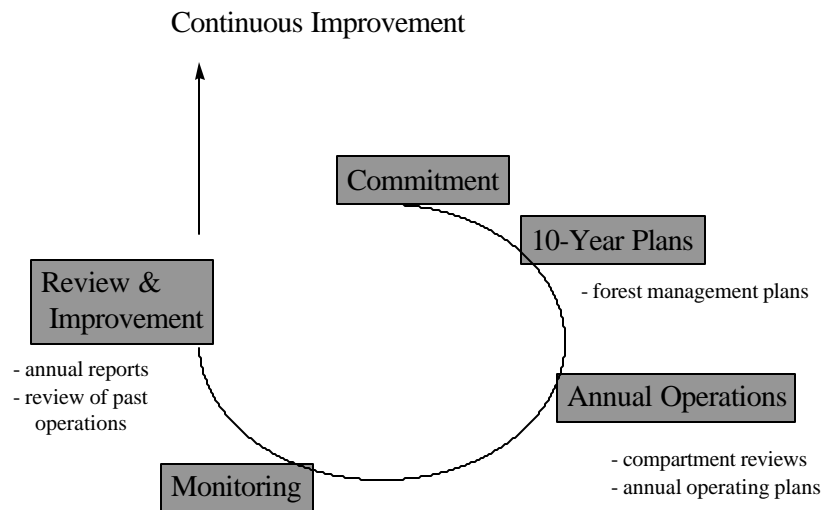


Figure 2-1. Components of a planning system.

Forest Values:	Principal standards or qualities of the forest considered worthwhile or desirable.
Gauges:	Indicators that can only be monitored. In contrast, levers can be managed directly.
Indicator:	Measurable variable used to report on the status of a criterion.
Levers:	Indicators that can be managed directly. In contrast, gauges can only be monitored.

Practices:	On-the-ground forest management activities designed to achieve the targets set for indicators.
Sustainable Forest Management:	Management to maintain and enhance the long-term health of forest ecosystems while providing ecological, social and cultural opportunities for the benefit of present and future generations.
Target:	The desired level to be achieved by an indicator.

3. Role of the Public in Forest Management Planning

The purpose of public participation in the State Forest planning process is to ensure that forest planning is open and accessible to everyone with a concern about the State Forest. The forest managers must ensure that those people:

- are made aware that planning is being undertaken,
- have reasonable opportunity to make their views known,
- can see that their views were fairly considered in the process, and
- can see that the plan is being implemented.

The means of reaching this goal are to:

- draw up a detailed schedule for public input from start to finish of the planning process,
- prepare a list of people and groups likely to have an interest in the forest plan,
- create a brief communications plan outlining how the MDNR has ensured that all ownership types, ages, cultural backgrounds and organizations were at least informed that forest planning was being undertaken,
- set up a three-level consultation process (as described in Section 6.2), and
- document communication efforts and public response.

4. Criteria and Indicators

In order to make sound forest management decisions, it is necessary to identify what people value about the forest being managed. These broad values or characteristics are called criteria. Several groups have undertaken the task of identifying criteria. The Canadian Standards Association (CSA), for example, outlines six national-level criteria to guide sustainable forest management in Canada (CSA 1996a). The Great Lakes Forest Alliance (GLFA) developed five regional-level criteria for the Upper Great Lakes Region (GLFA 1998). Before the forest management planning process can begin on the State Forest, it is important that a set of local criteria be identified.

Each criterion identified for the State Forest will have one or more indicators assigned to it before the formal planning process begins. Indicators measure how well the local criteria are being maintained and enhanced. Local criteria and indicators help forest planners to assess sustainability and report the results to the public. The success of a management plan can be assessed by evaluating the measurable indicators identified for each local criterion.

Described below is a process for developing a set of local criteria and indicators for the State Forest. A description of how this process was used for the LSSF can be found in Appendix 1.

4.1 Public Participation

The final set of local criteria and indicators will depend on the specific characteristics of the State Forest, and its local priorities and circumstances. To capture these items, the final set of local criteria and indicators should be determined through a public participation process. Public participation allows people who are directly affected by and/or interested in the management practices in the State Forest to identify the local criteria they want sustained and enhanced. The public can be engaged in this process through one or a series of workshops.

4.2 Establishing Local Criteria

To establish local criteria for the State Forest, planners should provide stakeholders with the opportunity to identify the characteristics of the forest that they value. The long list of items that will likely result can be grouped

into a manageable number of local criteria. The six national-level criteria of the CSA are meant to be broad in scope and, as such, can be a helpful starting point for identifying local criteria for the State Forest. Another useful source is the set of regional-level criteria and indicators for the Upper Great Lakes Region that was developed by the GLFA.

4.3 Establishing Indicators

Indicators are used to track the status of the local criteria for the State Forest. Therefore, at least one indicator is assigned to each local criterion, but an indicator may apply to more than one local criterion. To be useful, indicators should be:

- measurable,
- predictable,
- relevant,
- understandable,
- valid, and
- feasible.

It is important that indicators possess all these characteristics because, for example, while an indicator may be relevant and understandable, if it is not measurable it will not be useful.

When establishing indicators for the State Forest, it is helpful to formulate a list of potential indicators for stakeholders to review. For example, CSA identifies indicators for each of its six national-level criteria, and GLFA identifies indicators for each of its five regional-level criteria. These lists can be useful starting points for identifying indicators for the State Forest. Some of the CSA and GLFA indicators will not be well-suited to the State Forest, and others may require modification to make them suitable. New indicators, specific to the State Forest, should also be included.

4.4 Setting Targets and Practices for Indicators

A target is the desired level to be achieved by an indicator. Targets need to be set for each indicator, and appropriate technical expertise should be drawn upon to do so. The process outlined in Figure 4-1 can be used to identify targets. The public should be given the opportunity to comment on the established targets.

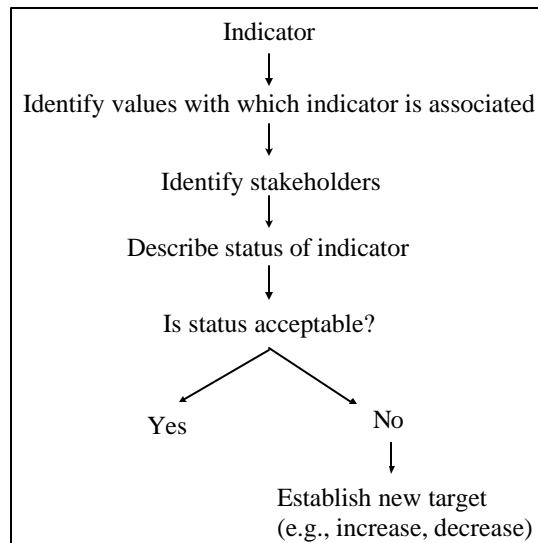


Figure 4-1. Suggested process for developing targets for indicators.

Target setting will require optimizing targets among several competitive indicators. Techniques for doing this can include the use of computer assisted decision support systems and the opinions of involved members of the public and outside experts.

Practices are on-the-ground forest management activities designed to achieve the targets set for indicators. Appropriate technical expertise should be drawn upon when identifying practices.

4.5 Categorizing Indicators as Levers and Gauges

Once a list of indicators has been developed, it is useful to divide it into those indicators that can be managed directly and those that can only be monitored. Indicators that can be managed are called "levers" and those that are monitored are called "gauges".

4.6 Assigning Responsibility for Indicators

For a sustainable forest management system to be effective, each indicator should be assigned to an individual, group or agency that will assume responsibility for monitoring that indicator relative to its target.

4.7 Monitoring and Reporting on Indicators

Monitoring and reporting on indicators is used to assess sustainability and to communicate results to the public. Monitoring and reporting on indicators also allows forest managers to assess the success of a management plan.

Each indicator should be monitored and a separate report should be prepared for each indicator. It is important to post and/or circulate the reports.

Each report should provide a thorough analysis of the results gathered from monitoring the indicator. For example, the report should include an analysis of the indicator on a landscape scale.

In addition to reporting on the results gathered from monitoring the indicator, each report should include an assessment of how well the indicator is performing. It is important that the indicators remain useful for measuring the status of the local criteria they were designated to measure.

4.8 Reviewing Local Criteria and Indicators

The local criteria and indicators established for the State Forest should be reviewed regularly and modified on the basis of changes in public values, technology, and our understanding of the forest ecosystem. Indicators that are no longer performing well will have to be replaced with more appropriate indicators. Changes to local criteria and indicators will require input from the public.

5. Background Information for the Plan

The planning team should assemble and evaluate the available background information on the State Forest for which management is being planned. This information will include department policies and procedures, the operations inventory, summaries of previous compartment plans and activity schedules, wildlife data, and resource values information.

Gathering background information will help to identify current information gaps. Reasonable efforts should be made to fill the gaps, but not so as to delay the planning process. The plan should be developed using the best information available at the time, identifying information gaps and presenting strategies on how to develop better information before the next planning cycle begins.

5.1 Guidance Documents

The forest management plan should be based on sound operational and silvicultural practices. Many of these practices will be based on information found in commonly available manuals or guidelines (e.g., the U.S. Forest Service Management Guides). Those manuals and guidelines that will be used in the preparation of the plan should be made available to all members of the planning team.

It is important to identify in the plan itself which manuals and guidelines have been used in its preparation.

5.2 Summary of Past Activities

A summary of past operations should be prepared that reports on the activities during the previous planning term (or the previous 10 years). Activities should be reported in terms of the planned and actual levels of accomplishment. Significant shortfalls or over-achievement should be detailed and explained. This report should critically examine the success of forest management in the previous 10 years and review techniques and strategies used in the past to determine if they were successful and are still appropriate to the current planning effort.

This report should provide tables on the level of resource production in the State Forest over the previous planning term. These tables should compare the actual levels of production (and use) to the planned or anticipated levels.

The summary of past activities should detail the statistics on timber sales planned for and those that actually occurred. The areas where harvesting was undertaken should be reported by forest type and silvicultural system. Forest renewal and tending activities should be described, along with the results of any surveys of forest conditions following these activities.

Table 5-1 is for reporting gross harvest accomplishments by forest type and is an example of the style of table used to report accomplishments. It identifies the forest for which it was prepared and the time period it covers. For each forest type, the area and volume of planned and actual harvest are reported. Similar tables should be produced for forest renewal and tending, forest recreation developments, forest recreation use (if available), wildlife habitat improvement and forest monitoring.

The summary of past activities bridges management plans and provides the basis for confirming, refining or changing management strategies and approaches. This report will become a part of the plan within the forest history section (Section 6.3.1).

Table 5-1. Accomplishments in timber harvest.

State Forest:
Planning Term:

Forest Type	Planned Area	Actual Area	Planned Volume	Actual Volume

5.3 Resource Inventories

Resource inventories provide information needed for planning. They describe, in quantitative terms, the resources being managed. Two primary resource inventories are essential for planning: an ecosystem inventory and a values inventory (described in Section 5.4).

An ecosystem inventory classifies the land being managed into a variety of classes or components. This inventory describes the entire state forest. The current Operations Inventory provides this type of information for state forests in Michigan, and contains the data necessary to describe the resource. The Operations Inventory should be used as the basis for modeling and analysis, as has been done for a number of forests across the state. Data from the Operations Inventory can be combined with data on wildlife habitat to provide information on the extent of such habitat within the State Forest.

The stand types and land types in the Operations Inventory should be mapped for the entire State Forest to give the planning team an overview of the entire area being managed. Such maps should delineate all the land and forest types present. Use of a geographic information system (or manual overlays) allows the planning team to overlay a number of resource themes or attributes on the State Forest map.

5.4 Values Data and Maps

A values inventory describes discrete, special elements which may require special attention in the planning process. Values data and maps will be a focus for public discussions.

The planning team should have access to information on all special values present in the State Forest for which a plan is being prepared. This should include information from the local economic development office on future development planned for in the State Forest. A database and maps will allow for efficient maintenance and presentation of the values data. The values map (or series of maps) displays the geographic location of all special features, land uses, and values that must be considered in forest planning and for which information is available. The map will contain a wide variety of information, such as:

1. natural features (e.g., forests, fisheries, wildlife, wetlands, ecosystems),
2. resource uses (e.g., recreational trails, tourist establishments, private land, pits and quarries),
3. infrastructure (e.g., roads, rails, utilities transmission systems, waste-disposal sites),
4. cultural heritage (archeological) areas, displayed on the basis of the sensitivity of the specific site, and
5. other items.

A geographic information system can provide an excellent platform for such information. Both the map and database should be regularly (annually) updated.

For further discussion on values protection planning, see Section 6.6.3.

6. Forest Management Plan Requirements

This section provides direction on the minimum content and process requirements for a forest management plan for state forests.

The forest management plan should contain seven primary sections:

1. Terms of Reference
2. Public Consultation
3. Forest Description
4. Management Direction
5. Management Alternatives & Determination of Sustainability
6. Operational Planning
7. Monitoring and Reporting

The forest management plan will be a public document with a diverse audience. Although the subject matter is complex and the content is dense, the plan must be written in a simple style that can be easily understood.

The plan itself should be kept in a series of binders, along with its appendices and the maps that depict various State Forest attributes (e.g., forest composition, wildlife habitat, forest values, areas allocated for operations). A limited number of copies of the plan will be produced and kept in the area offices, the district office, the regional office and Lansing. The plan should be available for public inspection and viewing at the district office. A plain-language executive summary of the plan should be produced for public distribution and will include an overview map of where operations are expected to take place.

The plan represents the record of decision for the MDNR's proposed management of State Forest lands. As such, it should provide the rationale for managing the State Forest as proposed in the plan. The plan should identify the issues that were considered in its preparation and the type of public input that was received and addressed.

6.1 Terms of Reference

The planning specialist should prepare terms of reference for the planning process, identifying all members of the planning team, their roles and

responsibilities, presenting a schedule (Table 6-1) for the production of the plan, identifying key milestones and setting out the plan for public consultation. The terms of reference should also identify any problems or issues the planning team is likely to face in the development of the plan.

Enough detail should be provided in the terms of reference that the district supervisors can determine the staffing and funding requirements for the planning process. The terms of reference can be used to identify who will prepare each component of the management plan.

Once completed, the terms of reference should be forwarded to the district supervisors, the regional director and the division heads for their approval.

6.2 Public Consultation

This section provides guidance for the participation of the general public and other stakeholders in State Forest management planning. It is based on input from workshops held with LSSF stakeholders in 1998 and 1999. It also reflects some of the recommendations of McDonough and Thorburn (1997) and the guidelines for public participation outlined in the MDNR Operations Inventory Manual (MDNR 1995), which are found in Appendix 2. It meets all of the CSA requirements (CSA 1996a and 1996b). This system was modified during the final LSSF stakeholder workshop in February, 1999, to encourage a less formal structure of the public meetings than required by CSA¹.

The following framework for public consultation gives the managers of the State Forest flexibility, but requires that they meet some performance targets. It is a three-level consultation process consisting of broad-, medium- and fine-scale consultation.

¹ At the stakeholder workshop in February, 1999, some participants felt that the CSA requirements were too restrictive and gave the appearance of a closed meeting. After discussion, the terms of reference were modified to encourage members of the public to attend any or all meetings. This is consistent with the CSA, which requires a commitment on the part of some members of the public for continuous attendance throughout the planning process. CSA also requires that resource managers ensure a balance of perspective at meetings. The modified terms of reference still meet these requirements. There was also a reaction the name "Citizens Advisory Committee" (CAC), a comment that has occurred before. It was suggested that a group of people attending the public meetings does not have to be given a name, such as CAC, to meet the terms of reference.

Table 6-1. FMP timeline.

Milestone	Parties Involved				Month																				
	District Supervisors	Plannin g Team	General Public, Focus Groups, Public Meetings	NRC/ Regional and State MDNR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Preliminary data, local criteria and indicators, operations inventory, resource values inventory, etc.		✓	✓		Information gathered prior to the start of the planning process																				
Invitation to general public, focus groups, etc. to participate	✓																								
Milestone 1: Tentative objective setting		✓	✓																						
Milestone 2: Confirm objectives	✓	✓	✓																						
Management strategies, alternatives, ground rules, preliminary areas of operation		✓																							
Milestone 3: Update of management alternatives		✓	✓																						
Milestone 4: Present management alternatives		✓	✓																						
Preparation of preferred management alternative and operational planning		✓																							
Milestone 5: Inform of chosen alternative		✓	✓																						
Review and approval				✓																					

6.2.1 Broad Scale - Media-based Information

Broad-scale consultation consists of media-based information intended for the general public. The purpose is to gather input, although some will be “light” and probably not well informed. However, it will generate some high-quality original issues and sensitize all interested parties to the process at hand.

Several techniques for broad-scale consultation were identified at the LSSF stakeholder workshops² as being likely to succeed in the Upper Peninsula. These include mail-outs, toll-free numbers, Internet sites, etc. The response from the public should meet a prescribed level of awareness (e.g., 100 phone calls, letters or e-mails based on a certain percentage of the population). Some experience may be needed to develop the actual measure.

Examples of LSSF indicators that might be appropriate for Section 6.2:

- ◇ Response to public requests
- ◇ Public participation in review of initial plan and audit or assessment program

6.2.2 Medium Scale - Focus Groups

Medium-scale consultation consists of focus-group workshops. The purpose is to solicit issues, test responses and gain support for the process, particularly in some outlying areas of the State Forest that may not have easy access to the public meetings required at the fine-scale level. Focus groups will likely consist of a variety of forest users (stakeholders), including people from the general public and non-government organizations (NGOs), but not representatives.

Facilitated meetings should be held to discuss planning issues, present general information, and record the group’s responses. MDNR staff or consultants should serve as facilitators. This gives the planning team the opportunity to ask specific questions with which it may need help. Again, a target should be set to engage a certain number of people. The target

² See also Clark, T., C. Howard, and A. Hayes. 1999. Public Participation in Forest Planning in the Lake Superior State Forest: Finding the Right Pathway. Report #6 from the Lake Superior State Forest Sustainable Forest Management Pilot Project. 23p.

must be determined on the basis of a reasonable representation of interests, an appropriate percentage of the population, and an appropriate number of the State Forest communities. These meetings should be held in several geographic areas.

6.2.3 Fine Scale - Public Meetings

Fine-scale consultation consists of public meetings. The purpose is to review and comment on the broad- and medium-scale input, as well as issues involving the state's interests. The terms of reference for these meetings are described in Section 6.2.4.

A series of open meetings should be held to review and comment on forest objectives, management alternatives, and responses from other public consultation. The purpose of these meetings will be to provide advice to the planning team and the district supervisors.

These meetings will be open and attendance will be encouraged from a wide cross section of the public. However, to provide continuity, and to ensure that substantive comments are provided to the planning team, it is important that some individuals make the commitment to attend all or most of the meetings. The district supervisors may invite some people for the purpose of providing certain perspectives.

A successful outcome is measured by the group itself. A group that feels well-informed and well-connected to the decision makers is an indication that this fine-scale consultation has been successful. This should be documented.

6.2.4 Terms of Reference for Public Meetings

- The district supervisors must ensure a wide range of perspectives from individuals and groups with diverse interests in the forest, such as: forest-based, tourist, and other businesses, anglers, hunters, naturalists, local governments, trappers, trade unions, woodworkers, independent loggers, educators and the general public.
- The meetings will take place primarily during the preparation of the forest plan, but also occasionally during the term of the plan in order to review progress or consider major amendments.

- The minutes of the meetings should record opinions about the adequacy of the forest plan objectives and alternatives presented by the planning team.
- The meetings should provide an opportunity to record local knowledge and verify and improve the map of significant values within the State Forest.
- The meetings should provide an opportunity for the planning team to seek advice on optimal tradeoffs when necessary.
- The participants at these meetings may develop their own rules of procedure regarding chair, number of meetings, agenda, etc., although for practical purposes the planning team will normally set the agenda and run the meetings. In any case, participants must acknowledge the needs and timelines of the planning process that the planning team must meet.
- The MDNR should provide office support. District supervisors may decide to provide reasonable out-of-pocket expenses to certain people if attendance is a financial burden (e.g., if they must travel significant distances or if they require overnight accommodation).
- The district supervisors should ensure that the planning team provides all of the basic information necessary.
- Reports or minutes should be prepared by the planning team on behalf of the meeting participants. These should be made public and will form part of the consultation documentation for the plan.

These terms of reference should be used at the discretion of the district supervisors, who have signing authority on the forest plan.

6.2.5 Dispute Resolution

Mechanisms for dispute resolution are described in “Guidelines for Public Participation and Appeals” from the MDNR Operations Inventory Manual (MDNR 1995). The pertinent information is also reprinted in Appendix 2 of this guide.

As with any endeavor in which many parties are involved, disagreements are inevitable. When a member of the public objects to some element of the proposed plan there are two avenues of appeal.

The first appeal is to the district supervisors who are overseeing the work of the planning team. It is up to the planning team to ensure that the disputes of which it is aware are brought forward to the district supervisors, to represent both sides of any issue fairly, and to document the implications of all arguments presented. The supervisors must make tradeoff decisions in some situations, but only after the situations have been fully disclosed and discussed at the public meetings.

If the resulting decision is unacceptable to the party involved, a second appeal can be made to the regional level.

6.2.6 Schedule

Figure 6-1 shows where public input is provided throughout the 10-year planning term. (Table 6-1 outlined the timing of the planning process, including public participation.)

6.2.7 Documentation of Public Consultation

Documentation of the methods and results of public consultation will be of great importance because of the need to maintain accountability in the face of the flexibility of this process. Documentation should include:

- a general description of the communication methods used,
- number and type of meetings with the public or interest groups,
- copies of all letters from the public or interest groups,
- public meeting attendance, minutes, and reports,
- copies of advertisements, or “hard copy” from electronic or other media,
- an evaluation of the public consultation targets set for the planning team (e.g., if a target of 100 letters, e-mails, or phone calls is set during the planning phase, the district supervisors should comment on this), and
- dispute-resolution activities.

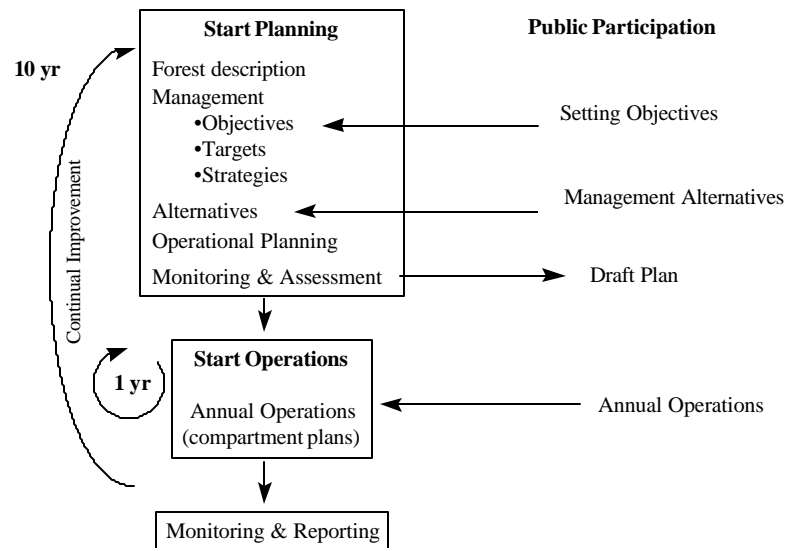


Figure 6-1. Forest management system.

6.3 Forest Description

The plan should provide a detailed description of all aspects of the forest, and provide the reader with a context for understanding the resources being managed. The forest description should provide baseline information for assessing the suitability and sustainability of management alternatives. The information should provide current benchmarks of the local criteria and indicators used for determining the sustainability of forest management.

The description of the State Forest should provide a physical, ecological and historical context to the forest under consideration. The description should cover four major sections:

1. Forest History
2. Administration
3. Forest Condition
4. Socioeconomic Context

The forest description should provide information on the structure, composition, function and use of forest and non-forest lands. Forest sustainability can be tracked by building up successive quantitative descriptions of the State Forest provided in consecutive 10-year plans. Much of the information used in this description can be prepared from an updated Operation Inventory. If more ecologically based inventories are available they can be used as the basis for planning. [A forest description that provides the information outlined in this section has been prepared for the LSSF (Callaghan 1999a)].

Examples of LSSF indicators that might be appropriate for Section 6.3:

- ◇ Miles of trail systems by land-use designation
- ◇ Size and distribution of natural and 'special' areas and allowed use for those areas
- ◇ Area of forest by type, age class and quality
- ◇ Area, percentage and representativeness of forest types in protected areas
- ◇ Miles of undeveloped shoreline

6.3.1 Forest History

This section should provide a summary of the known history of the State Forest, including information on how the forest has been used in the past and on the intensity of the use. The summary should cover the ancient past (pre-settlement), the long past (from settlement to 20 years ago), and the recent past (last 20 years).

If the information is available, it is useful to describe the "pre-settlement" forest. This description will serve as a context for deliberations on the type of future forest that is desired and the most appropriate management techniques for achieving it.

The section should provide an analysis of past management and the implications of the history of the area for future management. It will describe how past activities have influenced the forest. For example:

- Has wildfire suppression changed the composition of the forest?
- Has past use created an even-aged forest where uneven-aged forests once predominated? or
- Have there been any significant reductions in certain forest types?

At a minimum, the recent past covers the past 20 years. For this period, there should be historic records of adequate detail to document the recent evolution of resource management. The summary of past activities should provide the data and tables for this section, along with the analysis of management effectiveness. It will serve as an adaptive link to the past and will facilitate continuous improvement in future plans. This information on the recent past should be available in a form that can fit into the tables being used to project the future, thereby aiding in trend comparisons and judgments about a future course of action.

6.3.2 Administration

This section describes the administrative makeup of the State Forest and identifies its administrative subdivisions (e.g. forest areas). A map should be provided which displays the State Forest, its subdivisions, the surrounding land ownership, and the counties and population centers.

The text of this section should describe the management responsibilities of the MDNR and its divisions in relation to the State Forest and the district. The role that each division fills in the management of State Forest lands is to be described and discussed. The staffing currently available can also be described.

6.3.3 Forest Condition

This section should provide baseline information on the current condition of the forest, as well as a description of the physical context within which operations and management will be carried out. The description should contain a common set of benchmark indicators for the State Forest (e.g., land area, forest area, forest composition, age-class distributions). The landscape of the State Forest should be described in terms of forest cover types and ecosystem types where that information is available. A comparison to past conditions described in the forest history section is recommended.

The Operations Inventory data may be the primary source of information for this section of the plan. The Operations Inventory describes the entire State Forest landbase and all of its land types and forest types. The Operations Inventory is also the base data used in annual operations planning (i.e., compartment planning). To maintain continuity between the

annual operations plans and the longer-term forest plan, it is necessary to use the same base information for both.

The forest description should document the present condition and extent of many of the biological indicators described in Section 4.3. Indicators presented in the forest condition section will provide the planning team and the public with a framework for determining the sustainability of the State Forest resource and its various elements.

The plan should provide a table of the land area, by stand cover types, within each land ownership in the district (Table 6-2), and discuss the significance of State Forest lands within the district. The specific location of State Forest lands should be discussed and mapped if possible. Any issues related to land ownership and boundaries should be detailed. The plan should also identify the procedures that apply when work is done in boundary areas. Strategies to mitigate boundary and ownership issues will be specified in the management strategies portion of the plan (Section 6.4.3).

Table 6-2. District land area by cover type and ownership.

State Forest:
Planning Term:

							(acres)
Cover Type	State Forest	National Forest Lands	Other Federal Lands	County Munic. Lands	Forest Industry Lands	Other Private Lands	TOTAL
Total							

Data source: U.S. Forest Service, Forest Inventory and Analysis data

The geology and soils of the State Forest should be described and, if possible, maps should be provided. The influence that geology and soils have on forest conditions and management practices should be discussed.

The regional climate should be described, as should any variations that are commonly experienced across the State Forest. The plan should identify average seasonal statistics for the temperature (e.g., averages, highs and lows), precipitation, and growing days, as well as the occurrence of significant weather events (e.g., wind, drought, thunderstorms). The influence of location and geography will be important when describing climate, especially in areas influenced by marine climate. The influence

that climate has on the management of natural resources should be detailed.

The ecological region(s) within which the State Forest is found should be described. A map showing these regions should be provided. The plan should discuss how differences in the ecological regions, if there are any, will affect management.

A description of the current forest cover and forest condition will be the basis for planning the use and management of the State Forest. It will provide a starting point for analysis, modeling and quantification of local criteria and indicators. The description should provide information that can be used to gauge the effectiveness of management and discern between management alternatives.

Within the Operations Inventory, land can be classified by area class and influence zone.

Area classes delineate timber productivity and use classes for all land according to the ability of the land to produce timber. The plan should summarize the State Forest based upon area classes (Table 6-3), and discuss their significance. Definitions of each of the area classes should be provided, along with the implications each has for forest operations. Additional tables describing the distribution of area classes by forest subdivision and/or cover type may also be desirable and informative.

Table 6-3. Area class distribution for the State Forest.

State Forest:
Planning Term:

Area Class	Acres	Percent
Commercial Forest		
Reserved Timber-producing Forest		
Productive Forest		
Non-timber-producing Forest		
Non-timbered Forest Land		
Water		
Total		

Influence zones are land-use classifications that identify the “primary” use of stands and compartments. They help to focus management strategies designed to meet specific objectives. For example, the deer-yard zone requires special prescriptions for conifer cover. Influence zones are part of the “coarse-filter/fine-filter” strategy for values protection described later in Section 6.4.3.

The current descriptions of each influence zone should be provided in the plan, as these define the purpose and, to some extent, the size of the zones. The plan should provide a table (Table 6-4) that displays the area distribution of State Forest land among the influence zones. Additional tables by subdivision and/or cover type may also be desirable and informative. The plan should describe each type of land cover and develop guidelines for managing/conserving each. In addition to these descriptions, the planning team should prepare strategies for undertaking forest operations in each zone. These will be presented in the management strategies section (Section 6.4.3) of the plan.

Table 6-4. Area by influence zone for the State Forest.

State Forest:
Planning Term:

Influence Zone	Acres	Percent
General Forest		
Travel		
Water		
Deer Yard		
Other Wildlife Habitat		
Recreation		
Wild or Natural Areas		
Undedicated		
Lease		
Total		

Stand cover type may be used as the primary planning aggregation at which forest operations will be undertaken. It is the level at which land can be manipulated to meet management objectives. The plan should provide tables describing the stand cover types from the current (updated) Operations Inventory (Table 6-5). Forest composition by stand cover type is

an important indicator of forest sustainability. Tracking changes in composition over a number of planning terms will chart progress toward the desired future forest condition. For the forested portion of the State Forest, a table should be provided of the age-class distribution of the forest and its cover types (Table 6-6).

Table 6-5. Area by stand cover type and subdivision.

State Forest:
Planning Term:

Stand Cover Type	Div. 1	Div. 2	Div. 3	State Forest
(acres)				
White Pine				
Red Pine				
Jack Pine				
Black Spruce				
Upland Spruce-Fir				
Tamarack				
Cedar				
Mixed Swamp Conifer				
Hemlock				
Softwood Subtotal				
Aspen				
Paper Birch				
Lowland				
Aspen/Poplar				
Northern Hardwood				
Oak				
Lowland Hardwood				
Hardwood Subtotal				
Lowland Brush				
Upland Brush				
Brush Subtotal				
Treed Bog				
Bog/Muskeg				
Marsh				
Wetland Subtotal				
Rock				
Sand Dune				
Grass				
Local Use				
Other				
Water				
Total				

Table 6-6. Age-class distribution of the State Forest by stand cover type.

State Forest:
Planning Term:

Age Class	Stand Cover Type 1	Stand Cover Type 2	Stand Cover Type 3	Total
(acres)				
0-9				
10-19				
20-29				
30-39				
40-49				
50-59				
60-69				
70-79				
80-89				
90-99				
100-109				
110-119				
120-129				
130-139				
140-149				
150+				
All Aged				
UNK				
Total				

The plan should describe wildlife habitat in terms of area available for various indicator (featured) species. MDNR has developed a standard set

of habitat types (broad forest types and seral stages) that will link to the forest cover types (Doepker 1998). The plan should provide a table of habitat areas by seral stage for the entire State Forest. Appendix 3 includes a table of 15 wildlife species chosen from the MDNR matrix as an illustration of the habitat associations that can be utilized.

By matching habitat types and seral stages with the habitat preferences of selected wildlife species or associations, the area of "suitable" habitat for those species can be approximated. The plan should provide a table identifying the suitable habitat area for the selected wildlife species or associations (Table 6-7). The species presented in Table 6-7 are those for which habitat areas were derived as part of the forest modeling exercise undertaken for the LSSF within its Sustainable Forest Management project.

Table 6-7. Area in suitable habitat for selected wildlife species.

State Forest:

Planning Term:

(acres)

Wildlife Species	Area in Preferred Habitat	
	Previous estimate	Current plan
Broad-winged Hawk		
Ruffed Grouse		
Barred Owl		
Pileated Woodpecker		
Least Flycatcher		
Ruby-crowned Kinglet		
Blackburnian Warbler		
White-throated Sparrow		
Snowshoe Hare		
Northern Flying Squirrel		
Black Bear		
Marten		
White-tailed Deer		
Moose		
Eastern Redback Salamander		

The plan should describe the recreational resources on State Forest lands. These will include, but not necessarily be restricted to, campgrounds, woodland trails, recreational lakes and rivers, and boat launches. It is recommended that recreational resources be mapped.

6.3.4 Socioeconomic Context

Forest sustainability is not limited to the sustainability of the forest and its dependent wildlife. Forest sustainability must also address the needs of the people and communities that derive benefits from the State Forest. Decisions on the management of State Forests have a significant influence on the local, regional, and state economies. It is important to provide the social and economic context within which the State Forest exists. Measuring the indicators developed for the planning exercise or those developed in the preparation of this manual (Section 4.3) will provide a good range of background information.

The management plan should include a socioeconomic profile of the local economy, describing population demographics, communities, community dependency, incomes, employment, and taxes. Most of this information is available through the national census or from local business development agencies. The planning team can use basic socioeconomic information to determine the relative importance of forest management across the economy of the community.

A description should be provided of the resource-dependent industries (e.g., forest products, tourism, trapping, hunting, fishing) in the area and highlight the influence of the State Forest on the industries. The contribution that the State Forest makes to the local and regional economy should be identified, as well as the level of production (user-days, volume, hunter success, hunter opportunities) and value of production traditionally provided by the State Forest.

Example of an LSSF indicator that might be appropriate for Section 6.3.4:

◇ Job/income/employment/retirement data

6.4 Management Direction

This section should describe the goals of MDNR and its divisions in relation to the management of the State Forest, enunciate the objectives and associated targets, describe any problems or issues associated with meeting objectives and targets, and outline the strategies that will be employed to achieve the plan's objectives.

The forest management plan establishes long-term direction for managing forests to achieve a desired future forest condition. Many factors will influence the management direction of the State Forest including:

- MDNR policy and legislation,
- resource management issues in the State Forest,
- public or stakeholder concerns,
- the current condition of the State Forest,
- values to be protected within the State Forest, and
- benefits to be derived from the State Forest.

The planning team must consider these factors when determining the benefits that can be derived from the State Forest and the values that require preservation.

A series of management alternatives should be constructed to assess the sustainability of management, to test long-term direction and to identify sustainable levels of production for the benefits to be derived from the State Forest. From the range of management alternatives, the preferred course of action will be chosen.

6.4.1 Policy Context

This section should describe legislation, regulation, policies and procedures that support the management activities in the state forest. It should be objective and factual in nature. Policy debates need to take place outside the realm of the actual creation of a forest management plan. (A list of enabling legislation and policies of MDNR is included in Appendix 4.) Analysis of management alternatives will help to ensure that the primary objectives of each division are assessed in developing the forest management plan.

Example of an LSSF indicator that might be appropriate for Section 6.4.1:

- ◇ Existence of audit or assessment program

6.4.2 Management Objectives and Targets

The objectives of the forest management plan should relate to the use and/or manipulation of forest cover. The plan should provide specific broad objectives addressing:

- future forest condition
- socioeconomic benefits
- environmental protection
- multiple use

These objectives should be consistent with the policy context (discussed in Section 6.4.1) and with values and indicators as determined through public consultation. The planning team, in association with the public, will develop the management objectives for the plan. A target should be developed for each indicator that is commensurate with the objectives.

Social benefit objectives will require community stability above other considerations. Targets can be expressed in terms of annual production or use. These will be refined in the assessment of management alternatives.

Environmental protection objectives will define what is to be protected, preserved or enhanced. Where quantified targets for such objectives are difficult to define, soft targets such as “minimizing impact”, “reducing negative impacts” or “increasing availability” are applied.

Multiple-use objectives can be defined through soft targets such as reduced user conflict or complaints.

One focus of the forest plan should be on the type of forest desired for the future. Many elements will contribute to such a desired future forest condition, including biodiversity, forest health, forest composition, and landscape fragmentation. The nature of forests is such that they change slowly over time in response to both people and nature. Forest condition targets will therefore be long-term (100 years or more) and broad in scope (total area in forest, broad composition and structure).

6.4.3 Management Strategies

A strategy is a means of achieving an objective or objectives. One strategy may contribute to achieving multiple objectives. The plan should present

and describe the management strategies that will be used to attain the plan objectives.

Forest organization

A key strategy to be developed, in light of the objective of forest management and the overall policy direction of the MDNR, is how the forest will be organized for management. The planning team should decide how the State Forest will be organized for planning and operations purposes. Any subdivisions used should be explained (e.g., forest areas will be used to prepare and undertake operations). If the plan is to be subdivided, full documentation (e.g., forest description, management alternatives, operations planning) specific to each subdivision should be provided. When subdividing a State Forest, the planning team may find it helpful to have sub-teams undertake the planning of each subdivision.

The planning team should select the types of areas on which forest operations (e.g., harvest, renewal, tending, access) will be conducted and those that will be left untouched. It should determine which parts of the State Forest will be available for various forest management activities. The Operations Inventory contains a number of classifiers that can be used as the basis for such a division of the forest (e.g., area class, influence zone). Summaries of the areas reserved from operation, based on the type of reserve (e.g., riparian, habitat, cultural), will be helpful.

It is very important that various types of land that are recognized in the plan have associated management strategies, e.g.,:

- in all riparian areas, the guideline for *Water Quality Management Practices on Forest Land* (MDNR, 1994) will be applied, or
- in all wild or natural areas, no timber harvesting or permanent access will be permitted.

The forest will also be subdivided in terms of “forest type”. Forest types are groupings of similar stands, to be managed according to a common set of silvicultural ground rules, which will form the basis for assessing forest sustainability. A variety of approaches can be employed when deciding upon forest type. Forest stand cover types from the Operation Inventory may serve this purpose directly or serve as the basis for forest types. Aggregation of forest types into larger aggregates or division into smaller units is possible. For planning and analytical purposes, each forest type will

types, a strategy for leaving 50% (or more, or less) of all merchantable white pine trees unharvested may be feasible. Another strategy may be to protect white pine regeneration through careful logging practices.

Table 6-9. Area in reserves by stand cover type and reserve class.

State Forest:
Planning Term:

(acres)			
Stand Cover Type	Riparian Habitat	Old Growth	All Reserves
White Pine			
Red Pine			
Jack Pine			
Black Spruce			
Upland Spruce-Fir			
Tamarack			
Cedar			
Mixed Swamp			
Conifer			
Hemlock			
Softwood Subtotal			
Aspen			
Paper Birch			
Lowland			
Aspen/Poplar			
Northern			
Hardwood			
Oak			
Lowland			
Hardwood			
Hardwood Subtotal			
Lowland Brush			
Upland Brush			
Brush Subtotal			
Treed Bog			
Bog/Muskeg			
Marsh			
Wetland Subtotal			
Rock			
Sand Dune			
Grass			
Local Use			
Other			
Water			
Total			

Table 6-10. Age-class distribution of the operable State Forest by forest type.

State Forest:
Planning Term:

(acres)

Age Class	Stand Cover Type1	Stand Cover Type 2	Stand Cover Type 3	Total
0-9				
10-19				
20-29				
30-39				
40-49				
50-59				
60-69				
70-79				
80-89				
90-99				
100-109				
110-119				
120-129				
130-139				
140-149				
150+				
All Aged				
UNK				
Total				

Values protection strategies

It is not possible to plan for the conservation of biodiversity on a species-by-species basis. Ecosystems are too complex to understand and manage in their entirety -- there are too many species, not enough is known about each, and there are many unknown species. Other values, such as the archeology of the Upper Peninsula and snowmobile trails, also need to be considered in planning. For the most part, MDNR has policies (Appendix 4) and programs in place or is developing them to protect these forest values. In this manual, this higher level of protection is referred to as the "coarse filter". Many forest values, however, such as historical sites or endangered species habitat, require special attention during planning. These special sites and species require "fine-filter" protection -- in other words, site-specific prescriptions or species-specific management. Table 6-11 outlines, in point form, the coarse-filter and fine-filter considerations to be followed for the maintenance of biodiversity in the forests of the Great Lakes St. Lawrence (GLSL) region.

Table 6-11. Coarse-filter and fine-filter steps for protection of landscape values.

Coarse Filter		
Step	Description	Examples or indicators
Step 1	Determine appropriate landscape pattern	Indicator = Forest age class
Step 2	Select appropriate silvicultural system	Selection, shelterwood or clearcut
Step 3	Inventory and determine protected areas	The Nature Conservancy guide for landscape (TNC 1998)
Step 4	Describe habitat patterns	Patch size
Step 5	Water-quality protection – establish riparian buffers	Water-quality guides
Step 6	Road management	Water-quality guides
Fine Filter		
Step	Description	Examples or indicators
Step 1	Determine species and sites requiring individual management	Deer management
Step 2	Apply guidelines and develop prescriptions for special-status species and sites	

The use of the “coarse-filter” and “fine filter” terminology is illustrated in Figure 6-2. Management techniques are described in guideline documents as shown in the figure as well. The following sections describe, in more detail, the actual requirements of this strategy.

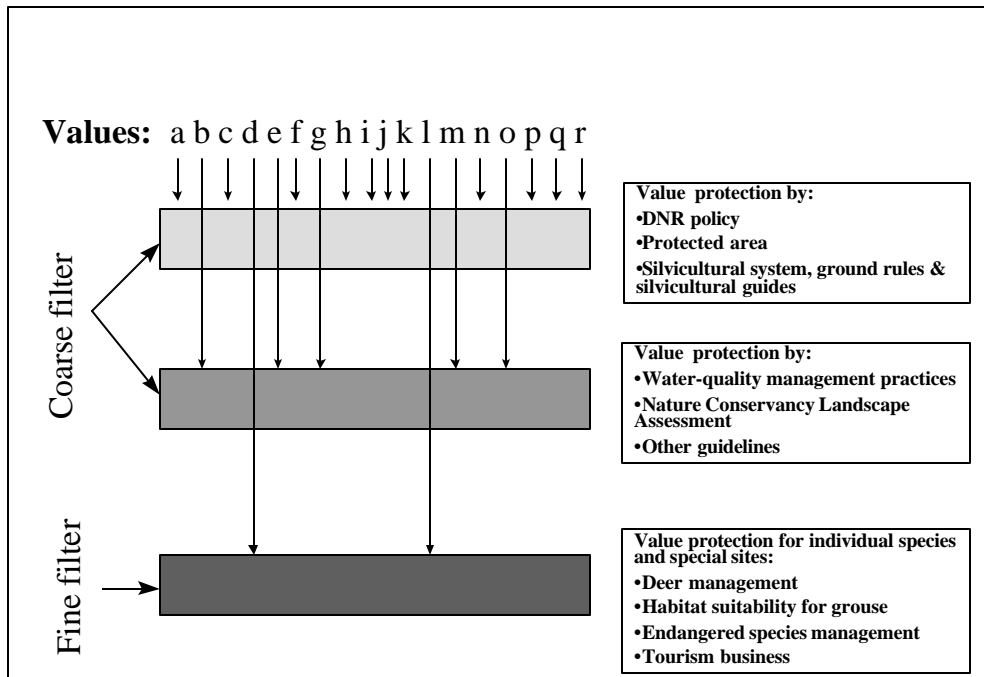


Figure 6-2. Coarse-filter and fine-filter strategies for values protection.

Coarse-filter Strategy:

Step 1: Determine appropriate landscape pattern

If forest management tries to mimic natural forest patterns, there is a good chance most species will find an appropriate niche in the managed portion of the landscape. Within the GLSL forests, renewal can be grouped into two main categories.

The first category is smaller-scale replacement of individual trees or small groups of trees. This is termed “gap”-type replacement and it typically occurs over a time scale of many years. Small blowdowns or mortality of large individuals are examples of gap-creating disturbances. The uneven-

aged tolerant hardwood stands that occur over much of Michigan originate from, and are adapted to, gap-type disturbances. The second category involves large-scale replacement. Canopy fires and large-area windthrow are examples of catastrophic disturbance. Even-age stands, such as jack pine, originate from such stand-replacing disturbances.

In reality, there is a spectrum of disturbances, from individual-tree mortality at one end to landscape-level fires at the other. This step in the coarse-filter strategy is a basic description of the forest pattern by age, species and patch size. This is the key step in a coarse-filter strategy. In the LSSF, the challenge is to establish a description of the future forest in which all of the natural forest types and age classes are represented. This target for cover types and age classes is one of the first issues that will have to be addressed by the district supervisors, the planning team, and the participants of the public meetings [Table 6-1, Milestone 2].

The coarse-filter strategy is consistent with the future forest condition, which is addressed in other parts of the manual (Sections 6.4.2 and 6.5). In the absence of a vision of the future forest that includes all forest types and age classes (i.e., habitat for all forest species), and the needs of non-timber forest users, the coarse-filter strategy is not meaningful.

Step 2: Select appropriate silvicultural system

Forest management involves the manipulation of forest cover through the application of sound silviculture. Silviculture encompasses the theory and practice of establishing composition, constitution and growth of forests. In manipulating forest cover, the manager must plan for the harvest, regeneration, and maintenance of the forest.

In general there are two broad types of silviculture: even-aged and uneven-aged. Even-aged silviculture generally attempts to renew forest stands (ecosystems) in which most trees are the same age. Such systems attempt to emulate catastrophic disturbance regimes that remove forest cover quickly and regenerate vegetation species suited to open conditions (shade-intolerant). Uneven-aged systems remove trees individually or in small groups and encourage the regeneration of vegetation types that reproduce under shade (shade-tolerant).

Three silvicultural systems are generally available for the management of Michigan's forest. Two types of even-aged silvicultural systems can be applied: the clearcut system or the shelterwood system. In the clear-cut system, one harvest operation is used to harvest the stand, and the forest

will regenerate in open sunlight. In the shelterwood system, a series of harvest operations is used to remove forest cover in stages so that the new forest is regenerated under partial sunlight. In uneven-aged forest types (e.g., northern hardwoods), selection silviculture is applied: trees are removed from a stand individually or in small groups, and the return harvest occurs in intervals of 15 to 30 years. In selection management, individual trees are marked for removal.

Each forest type will have a variety of silvicultural ground rules. Each silvicultural ground rule will specify:

- the silvicultural system,
- the type of harvest,
- the logging method,
- the site-preparation treatment,
- the renewal treatment (plant, seed, natural),
- the tending treatments that may be used,
- the regeneration standard, and
- the future forest type.

Optionally, costs can be provided for all elements. Silvicultural ground rules should be described for each current forest type and should also specify the future forest type that will result when each ground rule is applied. There is a range of harvest, renewal and tending activities that can be carried out at various intervals over the life of an individual forest stand. There should be enough ground rules defined to provide flexibility in the treatment of each forest type. The cumulative intended effect of these treatments on all stands [or compartments, or land-type association (LTA)] is to direct development of the State Forest toward the desired future forest condition.

A silvicultural prescription is the site-specific application of a silvicultural ground rule. Once a stand is scheduled for harvest, and the applicable ground rule is chosen, a prescription is created. This procedure falls within the operational planning section of the plan (Section 6.6).

Step 3: Inventory and determine protected areas

Part of the overall conservation of biodiversity, and protection of social values and other non-timber values, is achieved through protected³ areas. In preparing a comprehensive resource management plan, it is important to know what values are contained in protected areas. Resource surveys

³ The generally accepted definition of the term “protected” is no logging, no hydro, and no mining.

should include protected areas as part of the landbase. Note that protected areas include recreational, tourism, historical or other values besides biodiversity.

In the LSSF and across Michigan, one example of a process that is addressing this level of the coarse filter is the “Assessment of Regional Landscape Ecosystems for Statewide Conservation Planning” (TNC 1998). This is a combined effort of the MDNR and The Nature Conservancy. The protocol helps MDNR staff and others to evaluate areas with a high value for biodiversity at a state and local scale. The definition of “protected” is variable, but for the purpose of this planning manual it refers to areas in which harvest is not desirable. Many areas in need of some protection will be suited to some form of modified harvest.

Step 4: Describe habitat patterns

In natural, unmodified forests, animal and plant dispersal reaches a steady state across the landscape. However, as people modify the forest, some animal and plant dispersal becomes more restricted because of fragmentation. Some species thrive on fragmentation, most notably opportunistic species such as predators, parasites, exotics, and, in some cases, forest pathogens. As little research has been conducted to date on the connectivity requirements of most wildlife and plant species, the precautionary principle is best.

In developing landscape-level forest management plans, one key habitat link is the connection among riparian ecosystems. As most large, mobile mammals follow paths of least resistance, habitat links should be designed to encompass such areas as riparian corridors or ridge lines. For selection silvicultural systems, the residual forest is left relatively intact, with sufficient canopy cover to facilitate wildlife movement. However, this may not be the case with clearcutting and shelterwood systems.

In most parts of the LSSF, connectivity will not be an issue. Areas of concern will be peninsulas and areas of extensive clearcuts. At the time of preparation of this manual, guidelines for spatial requirements of wildlife in Michigan were under development and not available as reference documents.

Step 5: Water-quality protection – establish riparian buffers

Riparian areas are the transitional zones between water bodies and adjacent forests. These areas play an ecologically vital role in the regulation

of light penetration and water temperature, control of erosion and sedimentation, maintenance of groundwater tables, and provision of food for aquatic fauna. Riparian areas may also have important aesthetic and recreational values. The Michigan guideline for riparian areas, *Water Quality Management Practices on Forest Land* (MDNR 1994), is the standard, and should be followed.

In determining stand availability for harvest during planning, the portion of stands in riparian buffers should be ascertained. This is part of the preparation for planning. It ensures that accurate estimates are included in the model calculation. It is the responsibility of the biologist to determine the buffers.

Step 6: Road management

All new access roads need planning. Such roads do not include skidder trails or roads that are built on a site strictly for timber removal during operations. They do include those that are likely to remain for an indefinite period and will be available to other forest users.

There are many reasons for road planning. Aside from liability issues, the potential for increased conflict between different resource users cannot be ignored. Fisheries, which constitute a major value in Michigan, face potential threats from new access or construction activity. Roads that provide access to sensitive sites or threaten water bodies should be rehabilitated when the ecological or social considerations outweigh potential economic or recreational benefits. Road closures are part of a coarse-filter strategy for protecting forest values.

The Michigan guideline for *Water Quality Management Practices on Forest Land* (MDNR 1994) recommends a road plan detailing intended road construction, access, and proposed road decommissioning near water crossings.

Fine-filter Strategy:

The needs of many native species can be accommodated by the coarse-filter strategy described above. To ensure that no species are neglected, the specific requirements of particular species that are vulnerable to the stand- and landscape-level changes that result from forest management should be considered. Figure 6-2 illustrates how this strategy fits into values protection.

Step 1: Determine species and sites requiring individual management

Although Step 1 comes after a long list of coarse-filter, landscape-type requirements, in fact, it is the most public (and political) of the wildlife habitat programs of MDNR. Species such as deer, moose and bear are “special-status species”. For deer, in particular, it is often necessary to expend a considerable effort to establish optimal habitat in areas deemed suitable.

In determining the preferred management alternative, it is important to forecast adequately the demands of deer range management, so that the implications for other species are fairly assessed. Deer requirements for summer range (early successional cover types) and some mature conifer forest mean that many species will cohabit with deer. However, some will not. An over-emphasis on any one species can be detrimental and is inappropriate. This is the reason that special-status species appear on the fine-filter list, following the coarse-filter requirements.

The first step in applying the fine-filter strategy is to determine special status-species (plant & wildlife), seral stages and other areas that need individual attention in planning. These should be identified during the planning phase [Table 6-1, Milestone 2]. On the basis of the indicators developed for this manual and with the help of focus groups working with the planning team, special attention should be given to ensuring the protection and retention of species sensitive to habitat needs such as:

- vulnerable, threatened and endangered species and their habitats,
- regionally rare/uncommon plant and wildlife species,
- tree species that are at the edge of their natural range,
- specific wildlife species that have been identified as being sensitive to forest management activities,
- harvested species, including game species and furbearers, that are sensitive to habitat management,

and the maintenance and restoration of special sites such as:

- old-growth forests,
- winter cover for wildlife,
- supercanopy trees,
- recreation and tourism areas, and
- historical or archeological sites.

Step 2: Develop and apply guidelines for special-status species and sites

All of the species and sites finally identified as sensitive to disturbance from forest operations, and not conserved appropriately by coarse-filter strategy, require special prescriptions during compartment review. In the planning phase, every attempt should be made to document all values, from landscape-level concerns down to small nest-site issues. Fortunately, values can be classified fairly easily and only minimal information is required for long-term planning. Such information is needed for sites that will be harvested during the 10-year period of the plan, although a comprehensive values database, now under development, could be the source of much of the required information. Section 6.6.3 provides a template for systematically dealing with forest values.

Other strategies

Other important strategies that should be discussed include those for monitoring operations to ensure compliance and effectiveness, managing information to ensure the use of up-to-date data and information and the filling of information gaps, and reporting the level of achievement of objectives to ensure an adaptive approach to management.

6.5 Management Alternatives and Determination of Sustainability

As part of the planning process, the planning team should assess a range of management alternatives. Each alternative will generate a different mix of goods and services and a different combination of land uses, resource outputs and environmental effects. The planning team should define the preliminary set of management alternatives and prepare an analysis for public review that identifies the results of each alternative. The planning team should identify the general level of support or confidence it has in each alternative. If possible, it should come to a consensus on the preliminary preferred alternative.

Each management alternative should be analyzed to assess the ability of the forest to produce the desired benefits or outcomes over time. The results of each alternative should be expressed in terms of:

1. the future forest condition that will result,
2. the benefits or outcomes that will be derived over time,
3. the values that were changed, and
4. tradeoffs between indicators.

These attributes will be examined over a long time horizon (100 to 200 years) to determine the sustainability of the State Forest and the benefits it can produce.

A variety of information is necessary to undertake this analysis and there are a number of analytical tools and models available to assist in the analysis. As part of the LSSF Sustainable Forest Management project, one such tool, the Strategic Forest Management Model (SFMM), has been prepared with the existing Operations Inventory data (Callaghan 1999b). The tool used must be capable of forecasting forest conditions (including wildlife habitat) in response to forest operations and the production of the targeted levels of output.

The plan should identify and describe all of the analytical tools used and the role each model played in the preparation of the plan, as well as the indicators generated.

To assess forest sustainability, the planning team needs to consider the long-term effects and influences of management activities on the forest. In general, three types of information are required to assess management alternatives in the whole forest over an extended period: forest condition and extent, forest dynamics, and management options.

Forest Condition and Extent:	Refers to forest-type (stand type, LTA, other) associations and area by age class, area by land type or permitted land use and habitat conditions and suitability related to land and forest types.
Dynamics:	Refers to rates of natural change, successional pathways for each forest type resulting from various agents of change (e.g., temporal, catastrophic, managed).
Management Options:	Refers to silvicultural prescriptions, treatment timing, stumpage values, treatment costs, silvicultural success, investment levels, and treatment priorities.

The analysis provides a consistent approach to the assessment of each management alternative. It will project (forecast) how the forest will develop (e.g., extent, structure, composition and age class distribution) in response to each of the management alternatives.

It is desirable to develop a baseline alternative that represents the development of the forest in the absence of human intervention. Natural events (e.g., wind, fire, disease, insects) will provide the only agents of change in this alternative. Temporal and catastrophic forest succession pathways will control forest dynamics and can provide the planning team with benchmark levels of forest composition and habitat suitability. This alternative can provide the planning team with a valuable reference for determining what the future forest condition should be.

Each management alternative should be described using the indicators developed during the planning process. This will tie in the planning team's work with the public participation process. The difficulty with using indicators, as discussed in Section 4.3, is that they are not all easily measured. Some are closely related to others. For example, increasing certain forest types (Indicator- Area of forest by type, age class and quality) should have a positive effect on deer habitat and population (Indicator- Population levels, habitat and changes over time of selected species guilds). In turn, hunter activity should increase (Indicator - User days/activity). During the development of alternatives there is a core list of indicators, primarily levers, that are particularly useful. These core indicators are given in Table 6-12 along with some of the variables underlying the indicators. Each of the core indicators and their variables should be examined over a long time horizon (100 to 200 years).

The planning team should compare each of the management alternatives using the indicators. All of the indicators should be used in selecting the "preferred alternative". As analysis proceeds and the "levers" are adjusted to provide a range of alternatives, the gauges become the most useful indicators. Even calling these indicators "gauges" may be misleading. Some of them are not as quantifiable as a gauge; in fact, they are better described as warning lights, whistles or fog horns. Nevertheless, some clients will respond as much to the warning of the fog horn in the distance as to the immediacy of computer-generated numbers. The role of the planning team is to sort through the comments and concerns of team members, focus groups, other MDNR staff, and the public.

Table 6-12. Core indicators and their underlying variables.

Core indicator	Underlying variables
Area of forest by type, age class and quality	<ul style="list-style-type: none">• forest area (total),• forest area by "land use",• forest area available for timber production,• forest area by forest type,• forest area by forest type and age class,• operable forest area by forest type and age class
Population levels, habitat and changes over time of selected species guilds	<ul style="list-style-type: none">• forest area by wildlife habitat suitability for the chosen species
Forest growth	<ul style="list-style-type: none">• timber volumes available by forest type
User days/activity	<ul style="list-style-type: none">• user-days available by recreation type,• hunting opportunities available
Road density	<ul style="list-style-type: none">• areas accessed by roads or trails.

In some cases of developing preferred alternatives, it may be necessary to provide an objective scoring system that measures achievement against the objectives and targets for forest sustainability. Normally, however, the preferred alternative will be developed with a softer approach -- consensus within the planning team and among interested members of the public.

On the basis of the analysis of management alternatives, including examination of the local criteria and indicators, the planning team will choose a preferred management alternative. The rationale for the choice should be presented in the plan. All of the management alternatives considered and scored should be documented in the management plan. Detailed documentation should be provided for the preferred management alternative.

The preferred management alternative should achieve a realistic set of benefits or outcomes through the implementation of resource management strategies. The plan should discuss the implications of the preferred management alternative.

The documentation for the preferred management alternative should identify the (annual) level of activity (operations) required for the variety of activities covered by the plan (e.g., harvest area by forest type, areas regenerated by forest type, areas tended, access developed) and the outputs derived (e.g., timber volume, hunter success/opportunities, user-days) (Tables 6-13 and 6-14).

Table 6-13. Projected timber-harvest areas for the selected management alternative.

State Forest:
Planning Term:

(acres)					
Forest Type	Past Term Harvest	Planned Harvest Area Years 1-10	Projected Harvest Area Years 11-20	Projected Harvest Area Years 51-60	Projected Harvest Area Years 101-110
Total					

Table 6-14. Projected timber-harvest volumes for the selected management alternative.

State Forest:
Planning Term:

(cubic feet)					
Forest Type	Past Term Harvest Volume	Planned Harvest Volume Years 1-10	Projected Harvest Volume Years 11-20	Projected Harvest Volume Years 51-60	Projected Harvest Volume Years 101-110
Total					

The plan should identify the projected future forest structure that will be generated by the preferred management alternative. This can be done by recreating the forest description tables for the future forecast periods chosen by the planning team (e.g., 50 years from now, 100 years in the future).

6.6 Operational Planning

Once the long-term direction has been established for the State Forest and a preferred management alternative selected, forest operations (timber, wildlife, recreation etc.) should be planned. The preferred alternative will be the basis for setting the level of forest cover manipulations. This alternative will provide the level of activity associated with specific forest operations. Operational planning will translate the levels of activity associated with the preferred management alternative to the compartment or stand level. Once stands have been chosen, operational prescriptions should be set by selecting the silvicultural ground rule to be applied to the stand. For values affected by an operation, the appropriate values-protection prescription should be defined.

Operational planning identifies the specific areas (compartments and stands) in which operations are anticipated to occur over the planning term. In order to transfer the management alternatives to operations on the ground, the results should be linked back to the individual stands and compartments through the Operations Inventory.

Using standards established by the planning team that are consistent with the preferred management alternative, all compartments eligible to undergo a harvest, renewal or maintenance treatment over the 10 years of the plan should be identified. Eligibility can be based on many factors, such as:

- stand age
- time since last stand entry
- values that may be affected.

Eligibility maps of the entire State Forest will display the areas in which harvest, renewal, tending, improvement or protection activities may be undertaken.

Once all eligible areas have been mapped, the planning team must select the areas for operations that best fit the objectives of management. This

allocation process should be guided by allocation factors established by the planning team. Allocation factors may include:

- access
- likelihood of a successful timber sale
- stand operability constraints.

Maps should be produced showing the areas of planned operations for the 10-year plan term. A map should also display all the values in the vicinity of operations. This overlaying of proposed areas of operations and the values map will show which values will be affected by operations. For each of these values, a specific values protection prescription will be required.

A list of all stands or compartments proposed for operations should be presented (either in the body of the plan or appended).

6.6.1 Silvicultural Operations

For the areas in which harvest, renewal and tending operations are anticipated, prescriptions for operations should be produced. Silvicultural prescriptions for the operating areas will be based on the ground rules specified in the plan. It must be understood that these prescriptions are preliminary and will be reaffirmed or changed at the annual operating-plan level.

A list should be prepared by compartment of the stands in which operations will be undertaken and the ground rules that apply. This list should be provided in an appendix to the plan. Any stands not listed in the plan will not be available for forest operations unless they are formally incorporated in the plan through a plan amendment.

Examples of LSSF indicators that might be appropriate for Section 6.6.1:

- ◇ Forest regeneration by forest type and silvicultural prescription

A series of forecast tables should be prepared to identify the anticipated level of operational activity. Tables should detail the area to be harvested by forest type (Table 6-15) and age class and the anticipated volumes available. Forecasts for renewal and tending operations by forest type

should also be prepared (Table 6-16). Dollar values based on current average rates can be added to all activities.

Table 6-15. Forecast area of timber harvest activities by forest type.

State Forest:
Planning Term:

Age Class	Forest Type	Forest Type	Forest Type	Total (acres)
0-9				
10-19				
20-29				
30-39				
40-49				
50-59				
60-69				
70-79				
80-89				
90-99				
100-109				
110-119				
120-129				
130-139				
140-149				
150+				
All Aged				
UNK				
Total				

Table 6-16. Forecast of forest renewal and tending activities.

State Forest:
Planning Term:

(acres)

Activity	Forest Type	Forest Type	Forest Type	Total
RENEWAL				
Uneven-aged Management				
Selection Harvest				
Total Uneven-aged				
Even-aged Management				
Natural Regeneration				
Clearcut				
Strip Cut				
Seed Trees				
Shelterwood Seed Cut				
Subtotal Natural				
Artificial Regeneration				
Planting				
Seeding				
Scarification				
Subtotal Artificial				
Total Even-aged Renewal				
Total Renewal				
SITE PREPARATION				
Mechanical				
Chemical				
Prescribed Burn				
Total Site Preparation				
TENDING				
Cleaning				
Spacing				
Thinning				
Stand Improvement				
Total Tending				

6.6.2 Access Operations

Access development and maintenance activities should be defined and mapped. Each road to be constructed, maintained or closed by MDNR should be specifically identified.

Each new access route established will be developed on the basis of the prescription in the plan.

6.6.3 Values Protection Planning

Every identified value in the state forest should receive consideration during the planning phase. Whenever a value is brought forward from the public, a focus group or the planning team itself, it must be considered by the planning team. This section will assist the planning team in sorting and categorizing values so that they receive the proper management prescription designed to protect the value.

Prescriptions will result in no harvest, modified harvest, or regular harvest. This will be determined by the planning team, which will follow the coarse-filter/fine-filter strategy for ensuring that values are appropriately protected (Section 6.4.3). There are numerous values, though, and careful consideration is required before a prescription is made. Figure 6-3 is a guide to the possible directives that a planning team may follow to arrive at a prescription.

After analysis like that described in Figure 6-3, which results in each value being assigned to a type, along with a prescription, it is important that the value be properly tracked and documented. Fundamentally each value requires a unique identifier that is listed in the plan itself, on the operations maps and in the values database. The unique identifier is important for tracking purposes. A well organized, unique value-identifier system will provide continuity through any changes in personnel or management systems.

Example of an indicator that might be appropriate for Section 6.6.3:

- ◇ Size and distribution of natural and 'special' areas and allowed use for those areas

At the time of writing of this guide, the system for the value-identifier code (VIC) was not available. The planning team will be responsible for putting this system in place before planning begins. The VIC should incorporate location and a generic type of value so that everyone can read the code easily. For example, "CWS-01-AB23" could refer to: type -- a cold-water stream; serial number -- in case there is more than one; and location -- "AB23", geographical coordinates based on the same system used for timber mapping.

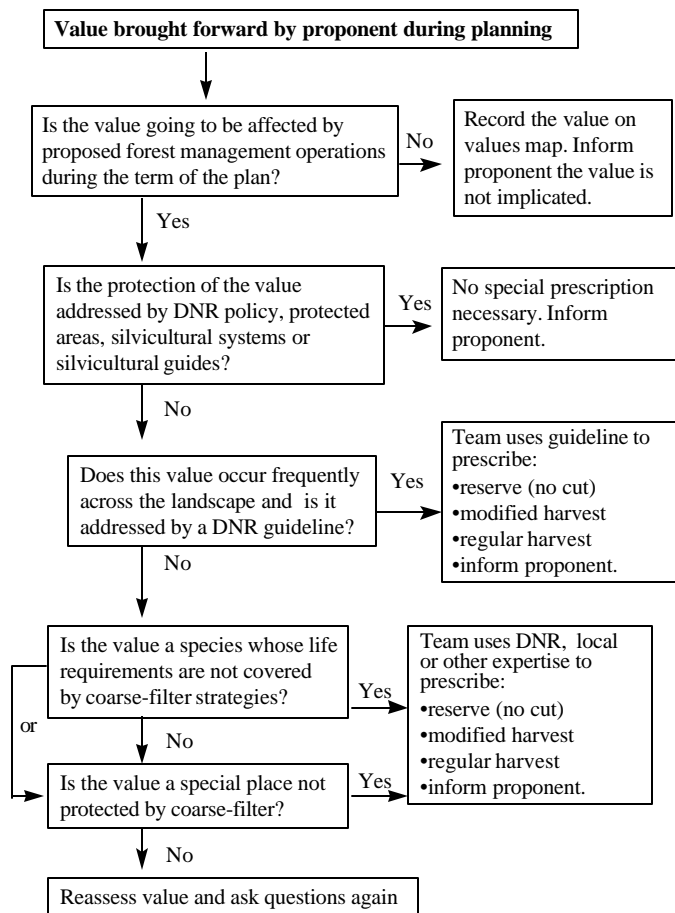


Figure 6-3. Questions to guide planning teams dealing with values protection.

Often there will be multiple values. A common example is state forest land adjacent to a tourist lodge, or a hotel on a good fishing lake. Both the lake and the lodge are values. Both require consideration for their own merits. A prescription for forest management would probably require a reserve immediately around the lake in accordance with the MDNR guideline *Water Quality Management Practices on Forest Land* (MDNR 1994). There may also be a need for some fine-filter protection for the lodge itself. For example, there may be a network of cross-country ski trails on state lands that the lodge maintains for its guests.

With the code and the prescription decided, the planning team needs to document its decisions for each value, remembering that operations may not be undertaken for a number of years in a 10-year plan. Several years into the planning term, the public may question the planning team's decisions. Figure 6-4 is a template for recording some of the basic information for each type of value. It records the instructions for informing forest-operations staff of special management requirements.

Identification

Value Type Code	Description of Type of Value:
-----------------	-------------------------------

Prescription

Reserve:	Management:	Access:
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Other comments or information:	Objection:
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Completed By:	Date:
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Figure 6-4. Values protection: Template for documentation.

All values of the same type will have basically the same prescription. Cold-water streams, “CWS” in our example, may all have the same buffer width as part of the prescription. These types of values are generally caught by the “coarse filter”. Therefore, for simplicity (less paper) in the plan, only values types need to be recorded in the body of the plan on a form of the type shown in Figure 6-4. Fine-filter values, which tend to occur in a “one-of-a-kind” situation, as Figure 6-3 will determine, follow the same procedure, but there will be only one occurrence of that “type” of value. All of the individual values and their VIC should be recorded in an appendix to the plan, where all of the same types of values can be listed together.

Where there are multiple values, the planning team can either treat them individually or amalgamate them and treat them as one type of value. This means the box on the form called “Value Type Code” (Figure 6-4) will have a different entry. Instead of two different value types, “Lake” and “Hotel”, and two prescriptions, the type could be called “Lake with Hotel”, or perhaps “LWH”. This will depend on the circumstances and the relationship among the values – some values may be right next to each other but quite unrelated. This process is intended to ensure that nothing slips through the filter of protection, but the actual process itself is not rigid.

It is likely that there will be between 10 and 20 types of values, although the number could be higher. For example, there may be many CWS values (cold-water streams).

In some situations, the planning team will have to recommend a prescription that is not agreeable to everyone. The box called “Objection” (Figure 6-4) is provided to help track possible conflict (attach more sheets as required!). These situations are particularly important to document. The conflict-resolution process as described in the public consultation section of this manual (Section 6.2) requires that the issue be brought to higher levels of MDNR for further consideration. All of the appropriate information that went into the decision will be required.

In summary, values will appear as follows in the plan:

- Types of values and prescription for that type in the plan (as in Figure 6-4)
- All individual values and VICs will be listed in the appendix (Appendix 1 of plan)
- All individual values and VICs will be designated on the values map

One of the important benefits of this long-term planning for values protection is that forest managers can anticipate the effects on forest resources and outputs. Some values, most notably riparian reserves, can cause a significant reduction in available wood supply. So values protection is a two way street: values require protection, but foresters need to be able to predict the amount of wood that will be available.

Finally, for the credibility of the planning system, it is also important to respond to proponents – whether they be the public or MDNR staff. This is considered part of the follow up to the public consultation described in Section 6.2 of this guide.

6.7 Monitoring and Assessment

To ensure that the management system is adaptive and that practices and strategies are effective, feedback mechanisms should be built into the planning system to assess achievement of targets and effectiveness of management.

Forest management activities should be routinely monitored to ensure compliance with the approved management plan and the specific prescription for the site. Monitoring is also undertaken to document observations of the effects of forest management on the forest itself and on the values in the forest.

This section of the plan should describe the monitoring program that will be in place over the term of the plan. The methods used should be identified and the frequency with which they will be employed.

7. Annual Operations Planning

Each year the managers of the State Forest should identify the specific locations in which operations (timber, wildlife, recreation, etc.) will be undertaken and confirm the prescription being used. Annual planning should include scheduling the specific operations identified in the plan. Only those areas for which operations have been identified in the forest management plan will be available for annual operations.

The annual operating plan should provide an executive summary of the year to come, along with all the specific documentation (compartment reviews) on the individual compartments in which operations will be undertaken.

The annual operating plan reveals areas selected for forest operations and confirms the prescriptions that will be employed. Harvest areas will be collected into timber sales and prepared for disposition through the normal channels. A list of the proposed timber sales will be provided for each State Forest subdivision (forest area).

The annual operating plan should provide a summary of all blocks in which timber operations (including sales), as well as other operations (wildlife, recreation, etc.), are scheduled for the coming year. It should provide tables that summarize the areas in which harvest, renewal, tending, access and monitoring operations are being undertaken. Individual compartment maps should be attached to the prescriptions. Compartment documentation should be in a format that can be easily removed for field use. A map should display the entire state forest and highlight areas where operations will take place.

The annual operating plan can be used to amend the management plan so as to include compartments that require operations but were overlooked during the development of the plan. Amendments will also be needed if new values are uncovered that require protection. The annual operating plan should highlight plan amendments. Copies of amendments should be filed with the management plan.

8. Monitoring and Reporting

Monitoring and reporting are essential components of the planning system. They form a sound basis for an adaptive approach to management. Reporting contributes to planning by providing the basis for confirming the achievement of objectives and for monitoring sustainability.

Two levels of reporting are required: annual and for the entire plan term. Annual reports will identify the level of achievement in the annual operating plan and describe and discuss any discrepancies.

Annual plans can be summarized into the long-term plan yearly but, at a minimum, the results of the annual reports should be compiled into a summary of past operations at the end of the planning term and compared with the levels of activity proposed in the forest management plan. The summary of past operations will provide an assessment of the success of the forest management plan in meeting its objectives and providing for forest sustainability. Planned strategies should be reexamined for their effectiveness and appropriateness. By comparing forest conditions at the end of the planning term with those forecasted in the plan, managers will be able to measure the success with which they have achieved the desired forest-condition. The summary will provide recommendations on how managers can better meet their goals and objectives.

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Appendix 1. Establishing Local Criteria and Indicators for the LSSF: A Case Study

Public Consultation

The local criteria and indicators that have been identified for the LSSF were developed with stakeholders and MDNR staff. To achieve this, two workshops were held with MDNR staff and LSSF stakeholders in Newberry, Michigan on June 25 and 26, 1998 (Workshop I) and on October 21 and 22, 1998 (Workshop II). The results from Workshops I and II can be found in the LSSF SFM Project reports entitled *Workshop I Summary: Values and Indicators of the Lake Superior State Forest* (Hayes et al. 1999a) and *Workshop II Summary: Establishing Targets, Practices and Responsibilities for the Indicators of the Lake Superior State Forest* (Hayes et al. 1999b).

Establishing LSSF Criteria

To establish local criteria for the LSSF, participants in Workshop I were asked to identify what they value in the LSSF. Participants identified 268 characteristics of the LSSF that they value. After grouping similar values, they identified the following 12 local criteria as those that are important to sustain and enhance:

1. Ownership Patterns
2. Institutional Processes
3. Recreation
4. Multiple Use
5. Spiritual
6. Social/Cultural
7. Economic Health
8. Biodiversity
9. Healthy Forests
10. Biological Cycles
11. Quality of Water and Soil Resources
12. Unique Features

Establishing LSSF Indicators

Workshop participants identified indicators for each of the 12 local criteria. To help with this task, participants were given the CSA indicators (CSA 1996a) to review and consider as potential indicators for the LSSF. After

stakeholders had the opportunity to fine-tune their list at Workshop II, the LSSF project team reevaluated the indicators against the CSA indicators. Most of the LSSF indicators are comparable to a CSA indicator. CSA indicators not captured by LSSF indicators were reviewed by MDNR staff. Of the 40 CSA indicators that were reviewed, 14 were deemed suitable for the LSSF and were added to the list of LSSF indicators. A summary of the 56 LSSF indicators and the local criteria with which they are associated is presented in Table A1-1. Descriptions of the LSSF indicators are provided in Table A1-2.

Setting Targets and Practices for LSSF Indicators

Preliminary attempts were made to identify targets and practices for the LSSF indicators. Progress on this task is described in the summary report for Workshop II (Hayes *et al.* 1999). More work remains to be done, however.

Categorizing LSSF Indicators as Levers and Gauges

Following the workshops, the list of indicators developed by LSSF stakeholders was divided into “levers” (indicators that can be managed) and “gauges” (indicators that are monitored). Table A1-3 outlines which indicators are levers and which are gauges. Of the 56 LSSF indicators, 26 are levers and 30 are gauges.

Assigning Responsibility for LSSF Indicators

LSSF stakeholders were able to make some preliminary suggestions about who should be responsible for particular indicators. Following the workshops, the LSSF project team also outlined suggestions (Table A1-3) as to who should be responsible for particular indicators.

Table 1. Values and indicators as determined by LSSF stakeholders.

Indicator	Ownership Patterns	Institutional Processes	Recreation	Multiple Use	Spiritual	Social/Cultural	Economic Health	Biodiversity	Healthy Forests	Biological Cycles	Quality of Water and Soil Resources	Unique Features
Road density	✓				✓							
Ownership type and land use	✓											
Stewardship	✓											
Changes in ownership	✓											
Existence of audit or assessment program		✓										
Integrated planning system		✓	✓									
Response to public requests		✓										
Public participation in review of initial plan and audit or assessment program		✓										
User days/activity			✓		✓							
Miles of trail systems by land-use designation			✓			✓						
Size and distribution of natural and 'special' areas and allowed use for those areas			✓		✓							✓
Area of forest by type, age class and quality			✓					✓	✓			
Number, type and quality of educational and recreational resources			✓									✓
Diversity of recreational opportunities			✓			✓						
Quality of recreational experience			✓									
Provision for sufficient number of other values				✓								
Number of educational and recreational resources and presence of information resources					✓							
Change in status of land ownership, use and distribution					✓							
Amount of trash in forest					✓							
Number of historic sites						✓						✓
Presence and implementation of a historic/archeological resource plan						✓						
Cultural forest products						✓						
Wood product summary							✓					
Ratio of harvest to growth by volume, species and products							✓					

Table 1. Values and indicators as determined by LSSF stakeholders.

Indicator	Ownership Patterns	Institutional Processes	Recreation	Multiple Use	Spiritual	Social/Cultural	Economic Health	Biodiversity	Healthy Forests	Biological Cycles	Quality of Water and Soil Resources	Unique Features
Net quantity difference between growth and harvest							✓					
Correlation of LSSF with local economic development plans							✓					
Job/income/employment/retirement data							✓					
Area, percentage and representativeness of forest types in protected areas								✓	✓			
Forest regeneration by forest type and silvicultural prescription								✓				
Population levels, habitat and changes over time of selected species guilds								✓	✓			✓
Water quality									✓			
Presence of pest assessment									✓			
Forest growth									✓			
Exotic species									✓			
Cycles relative to historic patterns									✓			
Landscape health and integrity of natural cycles										✓		✓
Land ownership, use, quality and fragmentation											✓	
Landscape health and integrity of water and soil resources											✓	
Presence of land-cover assessment/ inventory											✓	
Quality of fisheries												✓
Miles of undeveloped shoreline												✓
Wetlands												✓
Number of known forest-dependent species classified as extirpated, threatened, endangered, rare, or vulnerable relative to total number of known forest-dependent species								✓	✓			

[cont'd]

Table 1. Values and indicators as determined by LSSF stakeholders.

Indicator	Ownership Patterns	Institutional Processes	Recreation	Multiple Use	Spiritual	Social/ Cultural	Economic Health	Biodiversity	Healthy Forests	Biological Cycles	Quality of Water and Soil Resources	Unique Features
Number of known forest-dependent species that occupy only a small portion of their former range								✓	✓			
Area and severity of fire damage									✓			
Mean annual increment by forest type and age class									✓			
Percentage of forest area having road construction and stream crossing guidelines in place		✓										
Tree biomass volumes									✓			
Existence of laws and regulations on forest land management		✓										
Management and development expenditures							✓		✓			
Contribution to gross domestic product (GDP) of the timber sector of the forest economy							✓					
Total expenditures by individuals on activities related to non-timber use			✓				✓					
Extent to which forest planning and management processes consider and meet legal obligations with respect to duly established Aboriginal and treaty rights		✓										
Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural, or spiritual sites					✓	✓						✓
Percentage of area covered by multi-attribute resource inventories		✓										
Mutual learning mechanisms and processes		✓										

Table A1-2. Local criteria and indicators for the LSSF as developed with input from LSSF stakeholders.

Local Criteria	Indicator	Description
Ownership Patterns	Road density	Type (primary, secondary, tertiary) and length (miles) of road and characteristics of the area within 1 mile of the roads.
	Ownership type and land use	Measures land ownership type (federal, state, corporate, individual, etc.), land use (productive, unproductive, recreational, etc.), land distribution and zoning practices.
	Stewardship	The level, quality, and quantity of stewardship on private land.
	Changes in ownership	Measures parcel size/parcel fragmentation.
Institutional Processes	Existence of audit or assessment program	Determines whether or not an audit or assessment procedure is in place.
	Integrated planning system	Determines whether or not a planning system is in place that takes into account values from the various parties interested in the forest.
	Response to public requests	Measures adherence to a policy for responding to public requests in a timely fashion.
	Public participation in review of initial plan and audit or assessment program	Determines whether or not the public has been given adequate opportunity to review the forest management planning process and the audit or assessment program.
	Percentage of forest area having road construction and stream crossing guidelines in place	Identifies how much of the forest has existing guidelines for road construction and stream crossings.
	Existence of laws and regulations on forest land management	Determines whether or not there are laws and regulations in place that address forest land management and direct forest managers in their daily operations.
	Extent to which forest planning and management processes consider and meet legal obligations with respect to duly established Aboriginal and treaty rights	Monitors the integration of relevant Aboriginal and treaty rights into the forest management planning process.
	Percentage of area covered by multi-attribute resource inventories	Measures the amount of forest where non-timber and timber resources have been inventoried.
	Mutual learning mechanisms and processes	The number of opportunities (e.g. conferences, workshops, etc.) for representatives from a broad range of interest groups to meet and discuss forest management issues.

[cont'd]

Table A1-2. Local criteria and indicators for the LSSF as developed with input from LSSF stakeholders.

Local Criteria	Indicator	Description
Recreation	User days/activity	The number of days people spend on various activities in the forest (e.g., hunting, fishing, camping, learning, enjoying nature, etc.).
	Miles of trail systems by land-use designation	Measures the miles of trail systems and trail use (e.g., snowmobiling, cross-country skiing, hiking, etc.).
	Size and distribution of natural and 'special' areas and allowed use for those areas	Measures size (acres), number, distribution and interconnectedness of natural areas, corridors, etc., and how those areas are used.
	Integrated planning system	Determines whether or not a planning system is in place that takes into account values from the various parties interested in the forest.
	Area of forest by type, age class and quality	Information from the Operations Inventory manual and basic Forest Inventory and Analysis (FIA). Small, uncommon forest types should be included.
	Number, type and quality of educational and recreational resources	The number of viewing areas, interpretive centers, areas and trails for both education and recreation.
	Diversity of recreational opportunities	The availability of different ways for people to use the forest provides a measure of the various ways they can access the forest.
	Quality of recreational experience	Surveys users of the forest to determine the level of quality of recreational experiences.
	Total expenditure by individuals on activities related to non-timber use	Measures the amount of money spent on non-timber activities such as snowmobiling, hunting, camping, etc.
Multiple Use	Provision for sufficient number of other values	Measures whether a sufficient number of indicators is satisfied for each value.
Spiritual	Size and distribution of natural and 'special' areas and allowed use for those areas	Measures size (acres), number, distribution and interconnectedness of natural areas, corridors, etc., and how those areas are used.
	User days/activity	The number of days people spend on various activities in the forest (e.g., hunting, fishing, camping, learning, enjoying nature, etc.).
	Number of educational and recreational resources and presence of information resources	The number of viewing areas, interpretive centers, areas and trails for both education and recreation. Monitors the presence of signage, greetings, pamphlets, etc., that enhance the public's enjoyment of the forest.
	Change in status of land ownership, use and distribution	Tracks change in ownership type (federal, state, corporate, individual, etc.), land use (productive, unproductive, recreational, etc.) and land distribution.

[cont'd]

Table A1-2. Local criteria and indicators for the LSSF as developed with input from LSSF stakeholders.

Local Criteria	Indicator	Description
	Road density	Type (primary, secondary, tertiary) and length (miles) of roads and characteristics of the area within 1 mile of the roads.
	Amount of trash in forest	A measure of how much trash is in the forest.
	Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural or spiritual sites	Monitors the integration of unique or significant Aboriginal sites into forest management plans.
Social/Cultural	Diversity of recreational opportunities	The availability of different ways for people to use the forest provides a measure of the various ways they can access the forest.
	Miles of trail systems by land-use designation	Measures the miles of trail systems and what the trails are used for (e.g., snowmobiling, cross-country skiing, hiking, etc.).
	Number of historic sites	Measures the number of historic sites that have been identified and conserved.
	Presence and implementation of a historic/archeological resource plan	The degree to which historic and archeological sites are addressed in the planning system.
	Cultural forest products	Identifies and lists products (e.g., blueberries, mushrooms, black ash bark, cattails, etc.).
	Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural or spiritual sites	Monitors the integration of unique or significant Aboriginal sites into forest management plans.
Economic Health	Wood product summary	Annual statement of wood products
	Ratio of harvest to growth by volume, species and products	Compares data on volume of trees harvested by species and products with data on tree growth.
	Net quantity difference between growth and harvest	Compares trees grown to trees harvested.
	Correlation of LSSF with local economic development plans	Monitors how the current economic state of the LSSF compares with local economic development plans.
	Job/income/employment/retirement data	Examines readily available data on jobs, incomes, employment and retirement.

[cont'd]

Table A1-2. Local criteria and indicators for the LSSF as developed with input from LSSF stakeholders.

Local Criteria	Indicator	Description
	Management and development expenditures	Monitors trends in spending for forest management. Data for resource access (road construction), wildlife management, recreation management, fire management, etc. can be used to determine management and development expenditures.
	Contribution to gross domestic product (GDP) of the timber sector of the forest economy	The combination of salaries, wages, profits, taxes and royalties for the sale of timber represents the contribution of the timber sector of the forest economy to the GDP.
	Total expenditure by individuals on activities related to non-timber use	Measures the amount of money spent on non-timber activities such as snowmobiling, hunting, camping, etc.
Biodiversity	Area of forest by type, age class and quality	Information from the Operations Inventory manual and basic Forest Inventory and Analysis (FIA). Small, uncommon forest types should be included.
	Area, percentage and representativeness of forest types in protected areas	Protected forest areas (including uncommon types) can be used as ecological benchmarks to compare undisturbed areas with areas managed for other purposes (including open areas).
	Forest regeneration by forest type and silvicultural prescription	Measures forest regeneration on the basis of silvicultural guidelines and forest type.
	Population levels, habitat and changes over time of selected species guilds	A group of species identified for each forest age class can be used to monitor species diversity and health of an ecosystem. Species can be chosen on the basis of various factors (e.g., breeding and feeding requirements, habitat requirements, etc.).
	Number of known forest-dependent species classified as extirpated, threatened, endangered, rare or vulnerable relative to total number of known forest-dependent species	Monitors the number of forest-dependent animal and plant species in each of the noted classifications.
	Number of known forest-dependent species that occupy only a small portion of their former range	Monitors the number of known forest-dependent species that have experienced a reduction in their range of at least 50% in comparison with their known historical range.
Healthy Forests	Population levels, habitat and changes over time of selected species guilds	A group of species identified for each forest age class can be used to monitor species diversity and health of an ecosystem. Species can be chosen on the basis of various factors (e.g., breeding and feeding requirements, habitat requirements, etc.).
	Water quality	Measures oxygen content, sedimentation, coliform count, etc., of water bodies and compares them with standard levels.

[cont'd]

Table A1-2. Local criteria and indicators for the LSSF as developed with input from LSSF stakeholders.

Local Criteria	Indicator	Description
	Area of forest by type, age class and quality	Information from the Operations Inventory manual and basic Forest Inventory and Analysis (FIA). Small, uncommon forest types should be included.
	Area, percentage and representativeness of forest types in protected areas	Protected forest areas (including uncommon types) can be used as ecological benchmarks to compare undisturbed areas with areas managed for other purposes (including open areas).
	Presence of pest assessment	Measures the impact of pests (e.g., insects, diseases, etc.) on the forest.
	Forest growth	Measures the amount of tree growth in a given time.
	Exotic species	Inventories the number and type of exotic species in the forest.
	Cycles relative to historic patterns	Evaluates the current status of natural cycles on the basis of the historic patterns of those cycles.
	Number of known forest-dependent species classified as extirpated, threatened, endangered, rare or vulnerable relative to total number of known forest-dependent species	Monitors the number of forest-dependent animal and plant species in each of the noted classifications.
	Number of known forest-dependent species that occupy only a small portion of their former range	Monitors the number of known forest-dependent species that have experienced a reduction in their range of at least 50% in comparison with their known historical range.
	Area and severity of fire damage	Measures the extent of wildfires and the stress they cause the forest. Wildfires are dominant ecological and environmental disturbances.
	Mean annual increment by forest type and age class	Measures, by forest type and age class, the average net annual increase in yield (expressed in terms of volume per unit area) of living trees up to a given age.
	Tree biomass volumes	Measures the volume of standing biomass and monitors if it is increasing, decreasing or remaining constant.
Biological Cycles	Management and development expenditures	Monitors trends in spending for forest management. Data for resource access (road construction), wildlife management, recreation management, fire management, etc. can be used to determine management and development expenditures.
	Landscape health and integrity of natural cycles	Measures the health of the cover (e.g., amount of water and air pollution) and the integrity of natural cycles.

[cont'd]

Table A1-2. Local criteria and indicators for the LSSF as developed with input from LSSF stakeholders.

Local Criteria	Indicator	Description
Quality of Water and Soil Resources	Land ownership, use, quality and fragmentation	Measures land-ownership type (federal, state, corporate, individual, etc.), land use (productive, unproductive, recreational, etc.), land quality and land fragmentation.
	Landscape health and integrity of water and soil resources	Measures the health of the cover (e.g., amount of water and air pollution) and the integrity of water and soil resources.
	Presence of land-cover assessment/inventory	Assesses and inventories geological features of the land.
Unique Features	Size and distribution of natural and 'special' areas and allowed use for those areas	Measures size (acres), number, distribution and interconnectedness of natural areas, corridors, etc., and how those areas are used.
	Number, type and quality of educational and recreational resources	The number of viewing areas, interpretive centers, areas and trails for both education and recreation.
	Number of historic sites	Measures the number of historic sites that have been identified and conserved.
	Population levels, habitat and changes over time of selected species guilds	A group of species identified for each forest age class can be used to monitor species diversity and health of an ecosystem. Species can be chosen on the basis of various factors (e.g., breeding and feeding requirements, habitat requirements, etc.).
	Landscape health and integrity of natural cycles	Measures the health of the cover (e.g., amount of water and air pollution) and the integrity of natural cycles.
	Quality of fisheries	Determines quality of fisheries as measured by stream classifications.
	Miles of undeveloped shoreline	Determines the miles of undeveloped shoreline and monitors changes.
	Wetlands	Inventories the number and type of wetlands and monitors changes.
	Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural or spiritual sites	Monitors the integration of unique or significant Aboriginal sites into forest management plans.

Table A1-3. Local criteria and indicators for the LSSF, with each indicator identified as a lever or a gauge. Responsibility for managing or monitoring each indicator is assigned to the state or district level.

Local Criteria	Indicator	Type of Indicator		Responsibility (MDNR Division)
		Lever	Gauge	
Ownership Patterns	Road density	✓		District (FMD ¹)
	Ownership type and land use		✓	State (Joint)
	Stewardship		✓	State (Joint)
	Changes in ownership		✓	State (Joint)
Institutional Processes	Existence of audit or assessment program	✓		District (FMD)
	Integrated planning system	✓		District (FMD)
	Response to public requests	✓		District (Joint)
	Public participation in review of initial plan and audit or assessment program	✓		District (Joint)
	Percentage of forest area having road construction and stream crossing guidelines in place	✓		District (Joint)
	Existence of laws and regulations on forest land management	✓		State (Joint)
	Extent to which forest planning and management processes consider and meet legal obligations with respect to duly established Aboriginal and treaty rights	✓		State (Joint)
	Percentage of area covered by multi-attribute resource inventories	✓		District (Joint)
	Mutual learning mechanisms and processes	✓		District (Joint)
	User days/activity		✓	District (Joint)
Recreation	Miles of trail systems by land-use designation	✓		State (Joint)
	Size and distribution of natural and 'special' areas and allowed use for those areas	✓		State (Joint)
	Integrated planning system	✓		State (Joint)
	Area of forest by type, age class and quality	✓		District (FMD)
	Number, type and quality of educational and recreational resources	✓		State (Joint)
	Diversity of recreational opportunities		✓	State (Joint)
	Quality of recreational experience		✓	State (Joint)

¹ Forest Management Division

[cont'd]

Table A1-3. Local criteria and indicators for the LSSF, with each indicator identified as a lever or a gauge. Responsibility for managing or monitoring each indicator is assigned to the state or district level.

Local Criteria	Indicator	Type of Indicator		Responsibility (MDNR Division)
		Lever	Gauge	
	Total expenditure by individuals on activities related to non-timber use		✓	State (Joint)
Multiple Use	Provision for sufficient number of other values	✓		State (Joint)
Spiritual	Size and distribution of natural and 'special' areas and allowed use for those areas	✓		State (Joint)
	User days/activity		✓	District (Joint)
	Number of educational and recreational resources and presence of information resources	✓		State (Joint)
	Change in status of land ownership, use and distribution		✓	State (Joint)
	Road density	✓		District (FMD)
	Amount of trash in forest		✓	District (FMD)
	Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural or spiritual sites	✓		State (Joint)
Social/ Cultural	Diversity of recreational opportunities		✓	State (Joint)
	Miles of trail systems by land-use designation	✓		State (Joint)
	Number of historic sites		✓	State (Parks)
	Presence and implementation of a historic/archeological resource plan	✓		State (Parks)
	Cultural forest products		✓	District (Joint)
	Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural or spiritual sites	✓		State (Parks)
Economic Health	Wood product summary		✓	State (FMD)
	Ratio of harvest to growth by volume, species and products	✓		District (FMD)
	Net quantity difference between growth and harvest	✓		District (FMD)
	Correlation of LSSF with local economic development plans		✓	State (FMD)
	Job/income/employment/retirement data		✓	State (FMD)
	Management and development expenditures	✓		State (FMD)

[cont'd]

Table A1-3. Local criteria and indicators for the LSSF, with each indicator identified as a lever or a gauge. Responsibility for managing or monitoring each indicator is assigned to the state or district level.

Local Criteria	Indicator	Type of Indicator		Responsibility (MDNR Division)
		Lever	Gauge	
	Contribution to gross domestic product (GDP) of the timber sector of the forest economy		✓	State (FMD)
	Total expenditure by individuals on activities related to non-timber use		✓	State (FMD)
Biodiversity	Area of forest by type, age class and quality	✓		District (FMD)
	Area, percentage and representativeness of forest types in protected areas	✓		District (FMD)
	Forest regeneration by forest type and silvicultural prescription	✓		District (FMD)
	Population levels, habitat and changes over time of selected species guilds		✓	State (WMD ²)
	Number of known forest-dependent species classified as extirpated, threatened, endangered, rare or vulnerable relative to total number of known forest-dependent species		✓	State (WMD)
	Number of known forest-dependent species that occupy only a small portion of their former range		✓	State (WMD)
Healthy Forests	Population levels, habitat and changes over time of selected species guilds		✓	State (WMD)
	Water quality		✓	State (DEQ)
	Area of forest by type, age class and quality	✓		District (FMD)
	Area, percentage and representativeness of forest types in protected areas	✓		District (FMD)
	Presence of pest assessment	✓		State (FMD)
	Forest growth		✓	State (FMD)
	Exotic species		✓	State (FMD)
	Cycles relative to historic patterns		✓	State (FMD)
	Number of known forest-dependent species classified as extirpated, threatened, endangered, rare or vulnerable relative to total number of known forest-dependent species		✓	State (WMD)

²Wildlife Management Division

[cont'd]

Table A1-3. Local criteria and indicators for the LSSF, with each indicator identified as a lever or a gauge. Responsibility for managing or monitoring each indicator is assigned to the state or district level.

Local Criteria	Indicator	Type of Indicator		Responsibility (MDNR Division)
		Lever	Gauge	
	Number of known forest-dependent species that occupy only a small portion of their former range		✓	State (WMD)
	Area and severity of fire damage		✓	State (FMD)
	Mean annual increment by forest type and age class		✓	District (FMD)
	Tree biomass volumes		✓	State (FMD)
	Management and development expenditures	✓		State (FMD)
Biological Cycles	Landscape health and integrity of natural cycles		✓	State (FMD)
Quality of Water and Soil Resources	Land ownership, use, quality and fragmentation		✓	State (FMD)
	Landscape health and integrity of water and soil resources		✓	State (FMD)
	Presence of land-cover assessment/inventory	✓		State (Joint)
Unique Features	Size and distribution of natural and 'special' areas and allowed use for those areas	✓		State (Joint)
	Number, type and quality of educational and recreational resources	✓		State (Joint)
	Number of historic sites		✓	State (Parks)
	Population levels, habitat and changes over time of selected species guilds		✓	State (WMD)
	Landscape health and integrity of natural cycles		✓	State (Joint)
	Quality of fisheries		✓	State (Fisheries)
	Miles of undeveloped shoreline	✓		State (FMD)
	Wetlands		✓	State (WMD)
	Extent to which forest management planning takes into account the protection of unique or significant Aboriginal social, cultural or spiritual sites	✓		State (Parks)

Note: The divisional responsibility for indicators was assigned arbitrarily on the basis of the general assumption that the state has more responsibility for overall long-term planning and land-use designation, as well as for the collection of broad social and economic information.

Appendix 2. Guidelines for Public Participation and Appeals from the MDNR Operations Inventory Manual

F. PUBLIC PARTICIPATION AND "OPEN MEETINGS ACT" GUIDELINES

1. PREMISE

Exchange of information and ideas with the public, and their participation in the review process is important in achieving the best combination of resource conservation and public benefits from Michigan's State Forest lands.

2. OPEN HOUSE

An open house (not a meeting format) will be scheduled in advance of the compartment review where all affected DNR/DEQ Divisions are available as a primary means for interested publics to discuss issues and preliminary prescriptions. Whenever possible, some of the open house hours should be scheduled during usual non-work hours for the general public. We will use the DNR Press Office news release service for the announcement of open houses, whenever time permits. In addition, both the open house and the compartment review will be appropriately announced in advance in the DNR Department Calendar.

3. THE OPEN MEETINGS ACT

The formal compartment review is where final decisions are made relative to prescriptions. It is therefore subject to the Open Meetings Act (PA 267 of 1976), and must be open to the public. Other provisions include:

- a. The minimal action which would meet the requirements of the Act would be to the posting of a notice at least 18 hours in advance indicating the date, time, and place. The notice must be accessible and visible for all 18 hours, therefore would best serve the purpose if posted outside the main office at or in the main entrance.
- b. Any citizen may also request that they be placed on a mailing list to receive notices.

- c. No person can be excluded from the meeting except for a breach of the peace actually committed at the meeting.
- d. Minutes must be kept of such meetings and must contain:
 - 1.) Time, date and place.
 - 2.) Resource Division representatives present.
 - 3.) A record of decisions.

Those requirements are adequately met in the records and forms already provided for in sections C and E.

- e. A person shall be permitted to address such a meeting. However, reasonable guidelines may be established to minimize disruptions, and as appropriate or needed, may include:
 - 1.) Requiring the person to identify himself.
 - 2.) Requiring advance indication of desire to speak.
 - 3.) Specifying time limitations.
 - 4.) Specifying the periods for public comment.
 - 5.) Must remain orderly.

4. THE COMPARTMENT REVIEW

- a. A reasonable effort will be made to give adequate advance notice to all publics with likely interest. In most circumstances this should include:
 - 1.) A printed notice at the facility.
 - 2.) A mailing to those on a mailing list or otherwise expressing interest. The mailing list will be maintained by each Forest Unit Manager.

- 3.) A mailing to all county and township clerk's offices in which affected compartments occur.
 - 4.) A press release by DNR Press Office. A specific local newspaper or two may also be specified if desired. This release may effectively be combined with the open house announcement in most cases.
 - 5.) An announcement in the DNR Department Calendar.
- b. Compartment review packages will be available upon special request, or may be reviewed at the open house or by special arrangement with the Forest Unit Manager.
 - c. Provision will be made to accept oral comments from the public. A record of those offering comment should be maintained. Persons with desired input who do not attend the compartment reviews must submit their written comments at or prior to the date of the open house, in order to be considered. This will provide time for review of both oral and written comments by DNR staff prior to the compartment review, so that all factors are considered, and an appropriate decision may be reached. Any such written comments will be shared with those in attendance at the compartment review either orally or by copy.
5. TIMETABLE

Situations will vary but our goal will be to provide information, notice, and opportunity for review and input according to the following schedule:

- a. At least one and preferably two months in advance of the open house, compartment review packages are provided to pertinent resource divisions and those publics who specifically request them.
- b. At least one and preferably two weeks in advance of the open house, a press release is issued for both the

open house and the compartment review. Advisement of the compartment review date is also made to other parties on the mailing list.

- c. Not less than one week after the open house the compartment review is conducted.

6. DELAYED DECISIONS AND CHANGES IN PRESCRIPTIONS

All public attendees who checked the “advisement box” on the attendance list, and all pertinent county and township clerk’s offices, will be advised of any delayed decisions or changes in prescriptions.

7. APPEAL

- a. The public is entitled to appeal the prescriptions made at formal compartment review, as well as delayed decisions, and subsequent significant changes in prescriptions.
- b. The process described below must be followed for all such appeals:
 - 1.) Appeals will be submitted by the appellant directly to the DNR Field Deputy for the Upper Peninsula or Lower Peninsula, as appropriate, with a copy to the Forest Unit Manager where the contested decision was made.
 - 2.) Any appeal must be postmarked not later than 45 calendar days after the compartment review, or 45 calendar days after the date of the memo of advisement for delayed decisions or changes in prescriptions.
 - 3.) An appeal will only be accepted from a person who has participated in the compartment review either through personal attendance, or prior submission of written specific prescription recommendations. An appeal may be dismissed without review when the appellant did not make use of the compartment review process provided.

- 4.) To be accepted, an appeal must state how the decision fails to consider comments previously provided, or how it violates laws, regulations, or policies.
 - 5.) Emergency actions are not subject to normal processes for notification, review, and decision-making, and are not subject to appeal. They include matters affecting public safety or welfare, or significant potential loss of resources, such as salvage after fire, storm, or insect and disease outbreak; or for emergency deer feeding: This does not preclude, however, the desirability of scheduling a mini-review when time permits, nor the need for evaluation of whether there may be more value or less impact in simply allowing the effects of a natural disturbance to remain as is.
- c. Review of Appeal:
- 1.) The DNR Field Deputy will be the sole appeal deciding officer.
 - 2.) The appeal must be decided within 30 calendar days after the closing of the 45-day appeal period.
 - 3.) The Field Deputy may at his/her discretion extend the appeal decision date for an additional 30 calendar days by notice in writing to the appellant, and copy to the Forest Unit Manager.
 - 4.) The Field Deputy will render a decision in writing to the appellant and Forest Unit Manager, including the basis for denying or granting the appeal.
- d. The above appeal process constitutes the final administrative opportunity for the public to influence a state forest prescription prior to implementation. The Field Deputy's decision represents the final administrative determination of the Department of Natural Resources. It is the position of the Department of Natural Resources that any filing for judicial review of a decision subject to

review under these guidelines is premature and inappropriate unless a plaintiff has first sought to follow all of the guidelines and opportunities described and provided above.

Appendix 3. 15 Species Selected from the Habitat Matrix (Doepker 1998)

SPECIES	Upland												Lowland											
	Deciduous				Coniferous				Mixed				Deciduous				Coniferous				Mixed			
	REG	YNG	MAT	OLD	REG	YNG	MAT	OLD	REG	YNG	MAT	OLD	REG	YNG	MAT	OLD	REG	YNG	MAT	OLD	REG	YNG	MAT	OLD
WHITE-TAILED DEER	X			X				X	X		X	X					X	X	X	X	X	X	X	X
MOOSE	X	X			X	X	X		X	X			X				X	X	X	X	X	X	X	X
BLACK BEAR	X		X	X	X				X		X	X		X	X				X	X				
MARTEN						X	X	X		X	X	X						X	X	X				
SNOWSHOE HARE	X			X	X			X	X			X					X			X	X			
NORTHERN FLYING SQUIRREL			X	X			X	X			X	X		X	X				X	X				
BROAD WING HAWK	X	X	X	X					X	X	X	X		X	X	X								
RUFFED GROUSE	X	X	X						X	X	X						X			X				
BARRED OWL			X	X	X		X	X	X		X	X		X	X							X	X	
PILEATED WOODPECKER			X	X			X	X			X	X		X	X				X	X		X	X	
LEAST FLYCATCHER		X	X	X																				
RUBY-CROWNED KINGLET						X	X	X		X	X	X						X	X	X				
BLACKBURNIAN WARBLER							X	X			X	X							X	X				
WHITE-THROATED SPARROW	X				X	X			X	X			X	X			X	X						
RED-BACKED SALAMANDER			X	X							X	X												

Appendix 4. MDNR Enabling Legislation and Policies

Table A4-1. Enabling legislation.

Number	Title	Description	Associated Policies
Act 17, Public Acts of 1921		An act to provide for the protection and conservation of the natural resources of Michigan.	Commission Policy 2604 FMD Policy 232 FMD Policy 241 FMD Policy 242 FMD Policy 243 FMD Policy 591 FMD Policy 592 FMD Policy 593
Act 39, Public Acts of 1978	Michigan Vehicle Code		FMD Policy 611 FMD Policy 621
Public Act No. 80 of 1986		Places specific requirements on management to inform employees of hazardous materials in the work place and how to work safely with these materials.	FMD Policy 122
Act 154, Public Acts of 1974	Michigan Occupational Safety and Health Act		FMD Policy 621
Act 178, Public Acts of 1962		An act authorizing and empowering the director of conservation to dispose of timber from state lands under the control of the Department of Conservation.	FMD Policy 241 FMD Policy 243 FMD Policy 251 FMD Policy 261
Act 217, Public Acts 1931	Municipal or Community Forest Act	Authorizes counties, townships, cities, villages and school districts to establish and maintain forests.	FMD Policy 341
Act 319, Public Acts 1975		Charges the MDNR with the responsibility to regulate use of off-road vehicles and to provide a recreational facility for that use.	FMD Policy 232
Act 329, Public Acts of 1969	Forest Fire Law	An act to provide for the protection of forests and forest values.	FMD Policy 511 FMD Policy 521 FMD Policy 522 FMD Policy 534 FMD Policy 581

[cont'd]

Table A4-1. Enabling legislation.

Number	Title	Description	Associated Policies
Act 348, Public Acts of 1965	Air Pollution Control Act		FMD Policy 522
Act 451, Public Acts of 1994	Natural Resources and Environmental Protection Act		FMD Policy 112
Public Law 95-313	Cooperative Forestry Assistance Act of 1978		FMD Policy 591 FMD Policy 592 FMD Policy 593
MDNR Director's Letter No. 16, Office of Environmental Affairs, Safety and Health			FMD Policy 123

Table A4-2. Descriptions of MDNR policies relevant to SFM.

Policy/Procedure Number and Date	Date	Policy Subject	Description
New Working Draft No. 1	February 27, 1998	Forest Management Division Management Team	The management team will coordinate division activities to fulfill its responsibilities as outlined in division's mission statement by: taking the lead in trying to sustain and improve the health, diversity, and productivity of forest resources and values; managing the state forest system for a broad array of products, services, and values in collaboration with the department's wildlife division and others; strengthening and diversifying Michigan's social and economic fabric through sustainable forest-based activities; and establishing and strengthening forest resource partnerships among broad representative interests.
Commission Policy 1033	January 1, 1977	Public Involvement in Activities of Department	Citizen participation and interest in the activities of the Department shall be encouraged in all possible ways.
Commission Policy 2002	March 11, 1993	Environmental Protection and Economic Development	Protection and enhancement of the natural environment is the Department's primary responsibility; however, innovative methods shall be sought to maximize benefits for both environmental and economic interests.
Commission Policy 2007	Date? (Supersedes 2111 of 1/1/77)	Deer Management	Manage deer by using management practices based on scientific research and surveys to achieve a quality deer herd that meets social, economic and recreational demands.
Commission Policy 2204	January 1, 1977	Reforestation	Reforestation will be done in accordance with overall forest resource management plans. Tree planting will be done only when artificial regeneration has been determined to be the most cost-effective method of achieving the best land use for the area involved.
Commission Policy 2207	May 11, 1979	Management of State Forests	The Department will consider all the values of forest resources and manage the total forest system under a management concept to ensure that it yields a combination of products, services and values that meet the economic and environmental needs of present and future generations. The Department will develop a comprehensive management plan for each designated state forest and each plan will be submitted to the NRC for approval.

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Table A4-2. Descriptions of MDNR policies relevant to SFM.

Policy/Procedure Number and Date	Date	Policy Subject	Description
Department Procedure 2207.7	June 9, 1978	Forest Management	Outlines principles to be followed by Forest Management and Wildlife staff who jointly prepare and issue guidelines to direct foresters and game biologists in preparing forest management plans.
Commission Policy 2604	January 1, 1977	Lands - Public Use of State Lands Other Than Parks and Recreation Areas	State-owned lands, other than state parks and recreation areas, will be managed for purposes for which they are best suited and in a manner that will benefit the general public in the most prudent and accommodating manner. Protection and enhancement of the natural environment is to be a key consideration in all management efforts.
Commission Policy 4208	January 1, 1977	Burning - Prescribed	The Department may use prescribed burning under carefully planned and controlled conditions as a tool in wildlife and forestry management practices.
Commission Policy 4603	January 1, 1977	Pesticides and Other Toxic and/or Persistent Chemicals - Use of in Department Programs	The Department will assure that pesticides are used wisely, safely and only after all other feasible alternatives have been ruled out.
FMD Policy 112	December 1, 1981	On-Duty Staffing of Field Offices for Forest Fire Control	To meet control objectives and to provide for the safety and welfare of the public, the Forest Management Division is required to maintain certain numbers of trained personnel on duty.
FMD Policy 121	December 1, 1981	Safety Policy - FMD	The division will provide and maintain the safest possible level of operation for employees and public alike.
FMD Policy 122	January 25, 1988	Hazard Communication Program	This policy is intended to help forest managers ensure a safe work environment for Division employees.
FMD Policy 123	September 8, 1988	Use of Respirators Policy	When respirators are required, it is the responsibility of the employer to provide the correct respirator and to establish and maintain a protective program for the respiratory equipment and the user.

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Table A4-2. Descriptions of MDNR policies relevant to SFM.

Policy/Procedure Number and Date	Date	Policy Subject	Description
FMD Policy 232	January 22, 1985	Off-road Vehicle Trails, Routes and Areas	The Forest Management Division will provide a system of managed trails, routes, use areas and camping facilities for the ORV user.
FMD Policy 241	February, 1994	Reforestation	New vegetative cover will be established within 5 years of stand removal.
FMD Policy 242	April 1, 1994	State Forest Nurseries	State forest nurseries produce reforestation stock for use on land administered by the MDNR. Production is designed to meet reforestation plans submitted by the field staff.
FMD Policy 243	April 1, 1994	Tree Improvement	The Forest Management Division will strive to plant trees of the highest possible genetic quality and to maintain a broad genetic base for each species.
FMD Policy 251	April 1, 1994	Disposal of Timber	State forest timber is prescribed for removal in accordance with management plans developed and approved at compartment reviews.
FMD Policy 261	July 1, 1983	Receipts and Remittances	The Forest Management Division will keep uniform records and prepare periodic summaries of volume sold and revenues. Records and summaries will be used for program monitoring.
FMD Policy 271	July 1, 1983	Forest Research and Experimentation	To test practices that best serve intensive forestry, the Division conducts some research and experimentation and participates in cooperative research projects with other divisions of the Department, educational institutions, and other government agencies.
FMD Policy 341	July 1, 1983	Municipal or Community Forest Act	Local public forests will be established for demonstration and other educational purposes.
FMD Policy 511	December 1, 1981	Five-Year Unit Fire Management Plans	The Forest Management Division will prepare Unit Fire Management Plans for each protection unit in the district. Plans are reviewed annually and revised every 5 years.
FMD Policy 521	December 1, 1981	Forest Fire Law	The Forest Management Division will ensure that forests and forest values are protected, the use of fire is regulated and penalties are provided for violation of the Forest Fire Law.

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Table A4-2. Descriptions of MDNR policies relevant to SFM.

Policy/Procedure Number and Date	Date	Policy Subject	Description
FMD Policy 522	December 1, 1981	Control of Open Burning	Open burning will not be allowed except with special permission. No burning will be allowed in areas adjacent to forest lands when the ground is not snow covered, without a permit from the MDNR.
FMD Policy 534	December 1, 1981	Reporting of Going Fires	Timely and concise reporting of fire-weather conditions and fire problems is required for the effective use of regional and state resources. The division is responsible for providing fire information to the Executive Office, news media and the general public.
FMD Policy 543	December 1, 1981	Safe Suppression of Power Line and Energized Area Fires	All personnel will use extreme caution when working on power-line fires and will carefully follow outlined procedures when working on any fire where energized conditions may exist.
FMD Policy 581	December 1, 1981	Prescribed Burning	Prescribed burning will be used under carefully planned and controlled conditions as a tool in implementing wildlife and forestry management practices.
FMD Policy 591	September 8, 1988	Forest Pest Management Policy	The Forest Management Division is responsible for the detection, evaluation and non-regulatory control of all forest pests on state forest lands administered by the MDNR. Forest pest management is used to reduce losses due to pests and to increase and enhance forest resource production and utilization.
FMD Policy 592	April 1, 1987	Pesticide Use Policy	Pesticides will be considered as a method of pest control. Label directions will be followed precisely, and safety precautions will be employed to protect human health and the environment.
FMD Policy 593	September 8, 1988	Gypsy Moth Management Policy	Gypsy moth will be directly suppressed when high-value recreation areas or timber growth and yield are threatened by gypsy moth defoliation.
FMD Policy 611	December 1, 1981	Equipment Preventive Maintenance	All forest management equipment will be maintained to ensure its safe and dependable operation.
FMD Policy 621	December 1, 1981	Equipment Preparation and Operation	The Forest Management Division is responsible for the safe preparation, operation and maintenance of departmental equipment.

This report was completed as part of the requirements for a project funded by the Great Lakes Environmental Protection Fund. The objective of the project was to develop a new forest management planning system for the Lake Superior State Forest that meets sustainable forest management standards, specifically those of the Canadian Standards Association and the Forest Stewardship Council.

Project Partners:

Michigan Department of Natural Resources

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Tom Clark (CMC Consulting)

Reports generated by this project include:

Project Summary: The Lake Superior State Forest Sustainable Forest Management Pilot Project

An Assessment of the Michigan Department of Natural Resources' Commitment to Sustainable Forest Management

The Lake Superior State Forest: A Description

Michigan Department of Natural Resources Operations Inventory: Survey Results

Roles and Responsibilities for Forest Management Planning in the Lake Superior State Forest

Public Participation in Forest Management Planning in the Lake Superior State Forest: Finding the Right Pathway

Establishing Criteria and Indicators for the Lake Superior State Forest

Workshop I Summary: Values and Indicators of the Lake Superior State Forest

Workshop II Summary: Establishing Targets, Practices and Responsibilities for the Indicators of the Lake Superior State Forest

Modeling Forest Management on the Lake Superior State Forest

Wildlife Habitat Projections for 15 Species in the Lake Superior State Forest

Risk Assessment of Forest Management for the Lake Superior State Forest

A Forest Management Planning Guide for the Lake Superior State Forest

Further information on this report or any of the reports listed may be obtained from:



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